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FORTY-SECOND ANNUAL REPORT

OF THE

SECRETARY

OF THE

STATE BOARD OF HEALTH

OF THE

STATE OF MICHIGAN

FOR THE

FISCAL YEAR ENDING JUNE 30, 1914.

BY AUTHORITY

LANSING, MICHIGAN
WYNKOOP HALLENBECK CRAWFORD CO., STATE PRINTERS
1915.

LETTER OF TRANSMITTAL.

Office of
Secretary of the State Board of Health,
Lansing, Michigan, July 1, 1914.

To the Honorable Woodbridge N. Ferris, Governor of Michigan:

Sir:—In compliance with Sec. 5 §4401, Act 18, P. A. 1905, of the laws of Michigan governing this Board, I have the honor to herewith submit my annual report for the fiscal year ending June 30, 1914.

Very respectfully,
JNO. L. BURKART,
Secretary and Executive Officer, State Board of Health.

MEMBERS

OF THE

MICHIGAN STATE BOARD OF HEALTH.

Victor C. Vaughan, Ph. D., M. D., *President*,
Ann Arbor.....January 31, 1919.
Edward T. Abrams, M. D., *Vice-President*, Hancock.....January 31, 1921.
John L. Burkart, M. D., *Secretary and Executive Officer*, Lansing.....March 29, 1917.
John H. Kellogg, M. D., Battle Creek.....January 31, 1917.
Andrew P. Biddle, M. D., Detroit.....January 31, 1919.
Henry S. Bartholomew, M. D., Lansing.....January 31, 1917.
William D. Farley, L. E., Battle Creek.....January 31, 1921.

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PART I.

REPORT OF THE SECRETARY FOR THE FISCAL YEAR, JULY 1, 1913, TO JUNE 30, 1914.

EXTRACTS OF MINUTES OF BOARD MEETINGS.

REGULAR QUARTERLY MEETING HELD AT LANSING, JULY 11, 1913.

Members present were: President V. C. Vaughan, Drs. Koon, Kellogg and Dixon.

A committee consisting of Drs. Koon, Abrams and Dixon was appointed to prepare a compilation of the rules and regulations of the Board, relative to the restriction and management of communicable diseases, in convenient form, for distribution to physicians and health officers.

Dr. Allen J. McLaughlin, U. S. Public Health Service, appeared before the Board and related his experience in the investigation of the international pollution of boundary waters. The general scope of the work was outlined and laid before the Board and the lines in which he desired co-operation explained. Arrangements had already been made by individual members of the Board to furnish a bacteriologist to conduct a laboratory at Port Huron, under the immediate supervision of Dr. McLaughlin. The Board ratified the action of the individual members and instructed the Secretary to continue the service at Port Huron in accordance with plans already approved.

A communication from Dr. Herman Ostrander recommending the appointment of Miss Ada Pomeroy as State Medical Inspector with authority to carry on a Tuberculosis Survey of Kalamazoo county, was read and on motion, the Secretary was instructed to tender the position to Miss Pomeroy, with the understanding that no salary should be drawn from the state for work.

The Secretary then reviewed the legislative enactments of 1913 which directly or indirectly affect public health work coming under the supervision of the State Board of Health.*

Act 255, P. A. 1913: An Act increasing the general appropriation to $15,000.

Act 98, P. A. 1913: An Act providing for the supervision and control by the State Board of Health over waterworks systems and sewage disposal systems, and providing for the appointment, duties, salary and expenses of a state sanitary engineer, and providing penalties and defining liabilities for violations of this act; and to repeal act number twenty-eight of the Public Acts of 1909.

Act 93, P. A. 1913: An Act for the supplying of individual drinking utensils in certain cases, by persons, firms and corporations, maintaining drinking fountain, water cooler, tank or other device for public drinking purposes; the posting of placards in certain cases and providing a penalty for a violation of the provisions of this act.

Act 123, P. A. 1913: An Act to provide for the prevention of blindness in the newly born by fixing the duty of the State Board of Health in regard thereto and compelling doctors, nurses and midwives to treat the eyes of

*These Acts were published in full in the 1913 Annual Report.

infants in a certain manner, and to provide a penalty for failure so to do, and to repeal Act Number 43 of the Public Acts of 1892.

Act 350, P. A. 1913: Amending Act 254, P. A. 1905. An Act to enable counties to establish and maintain public hospitals, levy a tax and issue bonds therefor, elect hospital trustees, maintain training schools for nurses, provide suitable means for the care of tuberculous persons, and to make possible the ultimate establishment of an adequate supply of hospitals.

Act 196, P. A. 1913: Amending Act 248, P. A. 1911: An Act providing for the incorporation of medical milk commissions, and certification of milk produced under their supervision.

Act 250, P. A. 1913: An Act providing for the registration of the purchasers of guns, pistols, other fire-arms and silencers for fire-arms and providing a penalty for violation.

Act 222, P. A. 1913: An Act to prevent and punish the sale of unclean and insanitary cream and milk and the use thereof in the manufacture of food products and to prohibit unclean and insanitary conditions of creameries, cheese factories, ice cream factories and milk dealers' establishments or outfits and fixing standards of sanitary milk and cream, and to regulate the sale and transportation of the same.

Act 151, P. A. 1913: An Act providing for the protection of the public health and the prevention of fraud and deception, by prohibiting the sale, the offering for sale or exposing for sale or the having in possession with intent to sell, of adulterated or deleterious sausage; defining sausage; and prescribing the penalty for the violation thereof.

Act 340, P. A. 1913: An Act to prevent and punish the sale of immature and unwholesome calves and veal.

Act 179, P. A. 1913: An Act to regulate, prevent and punish the feeding of the flesh of old, decrepit, infirm, sick or diseased animals and unwholesome offal to animals or fowls, and provide a penalty for the violation thereof.

Act 34, P. A. 1913: An Act to authorize the sterilization of mentally defective persons maintained wholly or in part by public expense in public institutions in this state, and to provide a penalty for the unauthorized use of the operations provided for.

Act 274, P. A. 1913: An Act to provide for the medical and surgical treatment of children who are afflicted with a curable malady or deformity, and whose parents are unable to provide proper treatment, providing for the expenses thereof, and prescribing the jurisdiction of the probate court in such cases.

Act 154, P. A. 1913: Amending Section 4419, of the Compiled Laws of 1897, pertaining to the prevention and abatement of nuisances.

The Secretary presented the applications of Mr. Warren H. Booker of Raleigh, N. C., and Prof. E. D. Rich of Ann Arbor for the position of State Sanitary Engineer, under the provisions of Act 98, P. A. 1913, and upon motion of Dr. Kellogg, supported by Dr. Koon, the President and Secretary of this Board were authorized to employ a sanitary engineer subject to approval of the Board at the next meeting at a salary not to exceed $2,500 per year.

The Secretary was instructed to consult Dr. Walter R. Parker, Professor of Ophthalmology, U. of M., relative to formulating a satisfactory method

of prophylactic treatment for the eyes of new born infants under the provisions of Act 123, P. A., 1913, and which would be promulgated through the medium of special bulletins of this Board and the State Medical Society for the information of all concerned, subject to approval of the Board at its next session.

Ritchie's Primer of Physiology by the World Book Company of Chicago, was presented to this Board under provision of Section 1, Act 146, P. A., 1895, as amended by Act 141, P. A. 1909. Action was deferred.

The Secretary outlined to the Board changes in the PUBLIC HEALTH Bulletin and his suggestions were adopted.

The Secretary made a report upon the tour of the Health train and was instructed to extend the thanks of this Board to the railroad officials for their generous services.

The question of health conventions was taken up and the chair appointed Dr. Kellogg and Dr. Biddle to arrange for these conventions.

The University of Michigan School of Embalming was placed upon the accredited list of the State Board of Health. Dr. Kellogg presented an interesting report of the Conference of State and Provincial Boards of Health which he attended as delegate of this Board.

The following resolution was adopted:

Inasmuch as the Illinois State Board of Health does not require former experience as a prerequisite to the issuance of Embalmers Licenses, reciprocal relations which heretofore have existed between Michigan and Illinois Examining Boards for Embalmers' Licenses are hereby discontinued.

REGULAR QUARTERLY MEETING HELD AT LANSING, OCTOBER 12, 1913.

The members present were: Drs. Vaughan, Koon, Biddle, Kellogg and Dixon.

The committee appointed to employ a State Sanitary Engineer reported that Prof. Edward D. Rich of Ann Arbor had been selected. Upon motion of Dr. Koon, supported by Dr. Kellogg, the appointment of Mr. Rich was confirmed, at a salary of $2,500.

On motion of Dr. Kellogg, supported by Dr. Biddle, the Secretary was instructed to arrange for sanitary conventions as he might deem proper and timely and report at the next meeting of this Board.

A communication from Mr. Chas. Ranger and Mr. W. D. Farley, relative to the Embalmers School at U. of M. was received and read, and upon motion of Dr. Kellogg, it was decided that the course at the U. of M. or any other school which the Michigan State Board of Health recommended be accepted in lieu of examination.

Upon motion of Dr. Kellogg, it was decided that the next Embalmers examination be held in Lansing, November 17-18-19, 1913.

The committee formerly appointed to revise the rules and regulations of this Board upon dangerous communicable diseases asked that more time be given them, which was granted.

Sanitary rules and regulations for barber shops and barber schools were presented and upon motion of Dr. Kellogg, supported by Dr. Biddle, the Secretary was instructed to approve rules submitted by the Barbers Board of Michigan.

On motion of Dr. Kellogg, after hearing the suggestion of the Secretary relative to Ritchie's "Primer of Physiology," it was decided that if this book were used in conjunction with the "Primer of Hygiene," by the same

author, published by the same company, it would comply with the requirements of the law and would then be approved.

SPECIAL MEETING HELD AT ANN ARBOR, NOVEMBER 5, 1913.

All members were present except Dr. Abrams.

The President announced that the meeting had been called for the purpose of conferring with representatives from Detroit and Highland Park, relative to the question of sewage disposal for Highland Park. Mr. Alfred Lucking of Detroit, attorney for Highland Park and Mr. Walter Barlow of Detroit, attorney for the city of Detroit presented their respective pleas.

Other representatives participating in the discussion were Mr. Thompson, Mr. Bartlett, Mr. Buckley, Prof. Hoad, for Highland Park; Mr. McCormick, city engineer and Mr. Wilson, appeared for Detroit.

Upon completion of the discussion the Board went into executive session and the following motion was adopted on motion of Dr. Kellogg:

That the request of Highland Park for connection with Detroit sewers be granted and that the proper order be prepared.

REGULAR QUARTERLY MEETING HELD AT JACKSON, JANUARY 12, 1914.

The regular quarterly meeting was called to order by the Secretary, January 9, 1914; no quorum being present a call was issued for January 12, 1914. The adjourned quarterly meeting was held at the Otsego Hotel at Jackson, January 12, 1914.

All members were present except Dr. Kellogg.

The regular order of business was postponed in order to consider the issuing of a special order on the city of Detroit directing that Highland Park be allowed to connect with the Morrell St. sewer of Detroit, the order made subsequent to the last meeting of this Board not having been complied with.

Messrs. Bartlett, Hoad, Thompson and Buckley appeared for Highland Park.

Detroit was not represented.

The representatives from Highland Park presented a proposed order which covered the matter of amount and distribution of expense and upon motion of Dr. Abrams, supported by Dr. Koon, the order was accepted, adopted and signed, and forwarded to the proper authorities.

On motion of Mr. Ranger, Mr. J. L. Applegate of Indiana, having been in business as a Licensed Embalmer for five years in that state, previous to his coming to Michigan, was granted permission to take the examination before this Board.

The schedule prepared by the committee appointed for the formulation of a card of instructions for health officers in relation to dangerous communicable diseases was read, discussed and adopted.

REGULAR QUARTERLY MEETING HELD IN LANSING, APRIL 14, 1914.

The members present were: Drs. Vaughan, Koon, Biddle, Ranger and the Secretary, Dr. Jno. L. Burkart.

The President discussed the advisability of prosecuting all careless health officers who violated the public health laws of the state and the rules and regulations of this Board, and upon motion of Dr. Abrams, supported by Dr. Biddle, the Secretary was instructed to confer with the Attorney General and if thought advisable by him to proceed legally against all health officers

who violated the public health laws of the state and the rules and regulations of this Board.

The Secretary reported that he had corresponded with Mr. H. P. Hughart, General Manager, G. R. & I. R. R., relative to transportation and cars for proposed tour of health train through the Thumb district and the Upper Peninsula during the month of August. Mr. Hughart had kindly consented to arrange for transportation and cars, and the Secretary was instructed to complete details and arrange for the tour as per schedule submitted.

The Secretary suggested that the rules and regulations should be revised and the special pamphlets which are now on file in this office be corrected to conform with the card. Dr. Koon and the Secretary were instructed to make the necessary revision.

The Secretary reported that the Attorney General had issued a ruling that no person other than the duly appointed and legally qualified health officer or some one acting under his instructions could remove a placard which had been placed upon any house or public place in accordance with the rules and regulations of this Board.

The Secretary advised the Board that communications had been received from health officers throughout the state advising him that in numerous instances drugless healers and others were attending smallpox patients diagnosed as chicken-pox. He therefore suggested that chicken-pox be placed upon the list of communicable diseases reportable to this Board and it was so ordered.

A request from the State Sanitary Engineer for a raise in salary was read by the Secretary and upon motion of Dr. Biddle, seconded by Dr. Koon, the salary of the State Sanitary Engineer was placed at the maximum figure of $3,000 to take effect April 15, 1914.

Proposed changes in the rules and regulations pertaining to fumigation after measles, pneumonia and whooping-cough were suggested by the Secretary who was authorized to adjust the differences between the cards and literature upon these diseases.

Election of officers resulted as follows: President, Dr. Vaughan; Vice-President, Dr. Koon.

Mr. Ranger and the Secretary were appointed delegates to the Conference of Embalmers Examining Boards to be held at New Orleans in October, 1914.

The Secretary was instructed to represent this Board at the National Health Officers Association to be held in Washington, D. C., June 19-20, 1914.

A resolution commending the retiring Secretary, Dr. R. L. Dixon, for the work performed during his tenure of office as secretary of this Board was offered by Dr. Abrams and supported by Dr. Kellogg and unanimously adopted and was spread upon the minutes and a copy furnished Dr. Dixon.

On motion the meeting adjourned at 6 p. m.

EXAMINATION AND LICENSING OF EMBALMERS.

Under the provisions of Act No. 132, Laws of 1903, two examinations were held during the fiscal year ending June 30, 1914, as follows:

Ann Arbor, July 9, 10, 11, 1913. Lansing, November 17, 18, 19, 1913.

Of the 74 persons examined, 38 were granted licenses.

Reciprocal licenses were granted in 17 instances.

A statement of expenses incurred in the operation of Act 132 may be found on a subsequent page of this report.

The following letter, issued in June, 1913, will serve to show the scope of the embalmers' examination, and the conditions to be complied with on the part of the applicants for examination:

STATE BOARD OF HEALTH,

OFFICE OF THE SECRETARY, LANSING.

To the Funeral Directors and Embalmers.

GENTLEMEN:—

You are hereby informed that a meeting of the State Board of Health, called for the purpose of conducting an Embalmers' Examination, will be held in the city of Detroit, July 27, 28 and 29th, 1915, in the Detroit College of Medicine Building. The examination will commence at 9 o'clock, Tuesday morning, July 27th.

Candidates will be required to take both *written* and *oral* examinations with demonstration on the cadaver. Oral examinations will be given in the order applications are received. Some of the general subjects included in the written examination are:

(a) Visceral anatomy and the circulation of the human body, both arterial and venous.

(b) The nature, action, modes of action and comparative value of disinfectants.

(c) The methods of embalming and preparing bodies for transportation, also shipping rules.

(d) How diseases are spread, the best method for the restriction of diseases, and bacteriology in relation to the spread of diseases.

(e) The signs of death and the manner in which it is determined.

Those who desire to take the examination at this time, must fill out and return to the Secretary of the Board, the enclosed application blank, with an unmounted photograph of the applicant, signed in ink on the back and properly certified to by a notary. A fee of five dollars must accompany the application. Remittances may be made by express or postoffice money order or by registered letter. *Personal checks cannot be used.*

Applications should be on file in this office *thirty days* before the date of examination.

Application must be made in the name of an individual, and not of a firm.

Applicant's name must be signed in full.

In the examination, a rating of at least seventy-five per cent must be made by the applicant to secure a license.

By direction of the State Board of Health,

JNO. L. BURKART,
Secretary.

GENERAL AND SPECIAL WORK IN THE OFFICE OF THE SECRETARY.

Much of the general work of the office naturally groups itself under three heads: the collection of information, the compilation of information so collected, and the dissemination of such information as will be of service in the restriction and prevention of disease.

COLLECTION OF INFORMATION.

As the local health officer is the principal medium by which this Board may reach and instruct the public in matters pertaining to the prevention of sickness and deaths, the appointment, and the return of the names and postoffice addresses of the health officers, in each year, are matters of more than ordinary interest and importance.

In each year, it is often necessary to make a first, second and third request for information which will place this office in communication with the local health officers, and during the time which is thus used up in corresponding and waiting, an outbreak of a dangerous disease may begin and become widespread before this office can afford the usual assistance to the proper officials in the locality.

It should be said, however, that there is an increasing tendency to comply with the law in this particular, and local boards of health now generally act promptly and co-operate cordially with this Board for the suppression of disease.

Having established communication with the newly appointed local health officers, pamphlets and other publications which may aid them in their work, together with the usual blanks for reports of outbreaks of diseases in their locality, are mailed from this Board. In some instances, considerable correspondence is necessary to instruct the health officials how to properly care for sick and infected persons, and to make reports which will be of value in the compilations for the annual reports and other publications of this Board.

In addition to the collection of the usual information relative to outbreaks of dangerous communicable diseases in this State, special information upon subjects of public interest and importance, is sometimes asked for and is usually cheerfully furnished by a large number of health officers and other persons from whom the information is sought.

DISSEMINATION OF INFORMATION.

As stated in the preceding paragraph, each newly appointed health officer is supplied, by this office, with information relative to his duties. This information is contained principally in a pamphlet entitled "Health Officers' Manual," and in pamphlets covering the principal points in the etiology and methods of restriction and prevention of each of the dangerous communicable diseases.

Upon the receipt of information relative to an outbreak of a dangerous communicable disease, in addition to the usual instructions and blanks for

making the reports, there are mailed to the health officers a sufficient number of pamphlets, relative to the particular disease then present, for distribution to the families and immediate neighbors of the sick person. In this way, the people are educated as to their duty, under the law, and their co-operation with the local health officers often secured.

A pamphlet covering the law respecting nuisances, and containing information relative to their suppression, is published, and distributed among those persons directly interested, when a complaint of a nuisance is made to this office.

A pamphlet, giving the law and regulations of this Board, respecting the preparation and shipment of dead bodies, is published, and distributed among the licensed embalmers, railroad officials, and other persons interested in the transportation of the dead.

ANNUAL REPORTS.

About 2,500 copies of the annual report are published each year and about 2,400 copies are distributed among the following:

Members and ex-members of the State Board of Health; local health officers; secretaries of state, territorial and provincial boards of health; sanitary journal exchanges; library exchanges; city hospitals and sanatoriums; presidents and secretaries of county medical societies and State libraries.

PUBLIC HEALTH BULLETINS.

Beginning with the fiscal year, July 1, 1913, the quarterly bulletins issued by this Board were discontinued, and a monthly publication, greatly enlarged, covering various topics, directly and indirectly pertaining to all public health questions intended for the general public, is now being issued instead. Copies of this publication, *Public Health*, may be obtained upon request.

INVESTIGATIONS MADE BY THE STATE MEDICAL INSPECTORS FROM JULY 1, 1913, TO JULY 1, 1914.

Battle Creek, Mich., July 5, 1913.—Investigation of smallpox, by Dr. R. L. Dixon.

Howell, Mich., June 10, 1913.—Investigation of typhoid by Dr. H. S. Bartholomew.

Williamston, Mich., June 28, 1915.—Investigation of smallpox by Dr. H. S. Bartholomew.

Gull Lake, Mich., June 4, 1913.—Inspecting summer resorts at Gull Lake, by Dr. A. H. Rockwell.

Adrian, Mich., June 28, 1913.—Investigation of smallpox by Dr. Bion Whelan.

Adrian, Mich., July 2, 1913.—Investigation of smallpox by Dr. Bion Whelan.

Algonac, Mich., June 8 and 18, 1913.—Investigation of scarlet fever and measles, by Dr. W. H. Smith.

Mill Creek, Mich., June 30, 1913.—Inspection of school at Mill Creek, by Dr. Thomas M. Koon.

Muskegon Heights, Mich., July 3, 1913.—Investigating diphtheria, by Dr. Thomas M. Koon.

Clio, Mich., June 23, 1913.—Investigating typhoid fever, by Dr. Don D. Knapp.

Richland Twp., May 19, 1913.—Investigating typhoid fever, by Dr. George Alger.

Kinde, Mich., July 29, 1913.—Investigating smallpox, by Dr. W. H. Smith.

Jackson, Mich., Aug. 8, 1913.—Investigating diphtheria at Jackson Prison, by Dr. R. L. Dixon.

Saline, Mich., August 8, 1913.—Investigating smallpox, by Dr. H. S. Bartholomew.

Midland, Mich., June 21, 1913.—Investigating typhoid at dairy farm, Midland County, by Dr. Edward Goodwin.

Saginaw, Mich., August 26, 1913.—Investigating typhoid among employees P. M. R. R. yards, by Dr. Edward Goodwin.

Manchester, Mich., Sept. 10, 1913.—Investigating cases poliomyelitis, by Dr. J. F. Breakey.

Mancelona, Mich., Sept. 2, 1913.—Investigating smallpox, by Dr. S. Szudrawski.

Benton Twp., St. Joseph Co., May 25, 1913.—Investigating slaughter house by Dr. C. N. Sowers.

Benton Twp., St. Joseph County, May 28, 1913.—Investigating smallpox, by Dr. C. N. Sowers.

St. Joseph, Mich., Sept. 30, 1913.—Investigating sanitary conditions in city of St. Joseph, by Dr. C. N. Sowers.

Mancelona, Mich., Oct. 11 to 14, 1913.—Investigating typhoid, by Dr. S. Szudrawski.

Madison Center, Mich., Sept. 29, 1913.—Investigating typhoid, by Dr. George Lochner.

Cedar Springs, Mich., Aug. 6, 1913.—Investigating typhoid, by Dr. Thomas M. Koon.

Grand Rapids, Mich., Oct. 1, 1913.—Investigating typhoid at Soldiers' Home, by Dr. Thomas M. Koon.

Mackinaw, Wetmore, Mich., Oct. 11-16, 1913.—Investigating typhoid, by Dr. Thomas M. Koon.

Traverse City, Mich., Sept. 26-28, 1913.—Investigating typhoid fever at State Hospital, by Dr. C. C. Slemons.

Otsego County, Mich., Oct. 27, 1913.—Investigating typhoid fever, by Dr. H. S. Bartholomew.

Kalkaska County, Mich., Oct. 28, 1913.—Investigating typhoid fever, by Dr. H. S. Bartholomew.

Crawford County, Mich., Oct. 29, 1913.—Investigating typhoid fever at Grayling Hospital, by Dr. H. S. Bartholomew.

Climax, Mich., Nov. 6, 1913.—Investigating smallpox case, by Dr. A. H. Rockwell.

Cheboygan, Mich., Nov. 10-12, 1913.—Investigating smallpox and diphtheria, by Dr. Edward Goodwin.

Cheboygan, Mich., Nov. 20-22, 1913.—Investigating smallpox and diphtheria, by Dr. Edward Goodwin.

Shaftsburg, Mich., Nov. 24, 1913.—Investigating diphtheria, by Dr. H. S. Bartholomew.

Potterville, Mich., Dec. 11 and 12, 1913.—Investigating smallpox, by Dr. H. S. Bartholomew.

Otisville, Mich., Nov. 28, 1913.—Investigating smallpox, by Dr. Frank E. Reeder.

Caseville, Mich., Sept. 23, 1913.—Investigating typhoid fever, by Dr. W. H. Smith.

Emmet, Wales and Riley Townships, Nov. 20, 1913.—Investigating smallpox, by Dr. W. H. Smith.

Armada, Mich., Dec. 6, 1913.—Investigating scarlet fever, by Dr. W. H. Smith.

Vickeryville, Mich., Dec. 20, 1913.—Investigating cases of trachoma, by Dr. G. W. Petty.

Novi, Mich., Dec. 18, 1913.—Investigating smallpox, by Dr. James A. McVeigh.

Ingham County, Mich., Jan. 11, 1914.—Investigation of smallpox in Ingham County, by Dr. R. L. Dixon.

Delhi Twp., Ingham County, Jan. 9, 1914.—Investigating smallpox, by Dr. George E. Ranney.

Dewitt, Mich., December 26, 1913.—Investigating smallpox, by Dr. H. S. Bartholomew.

Quincy, Mich., Jan. 9, 1914.—Investigating smallpox, by Dr. H. S. Bartholomew.

Manistee, Mich., Jan. 9-10, 1914.—Investigating smallpox, by Dr. S. Szudrawski.

Emmett, Mich., Dec. 26, 1913.—Investigating smallpox, by Dr. W. H. Smith.

Adair, Mich., Dec. 27-29, 1913.—Investigating diphtheria, by Dr. W. H. Smith.

Wales, Mich., Jan. 3, 1914.—Investigating chickenpox, by Dr. W. H. Smith.

Port Austin, Mich., Jan. 5-6, 1914.—Investigating smallpox, by Dr. W. H. Smith.

Lake and Harrison Twps., Feb. 4-5, 1914.—Investigating smallpox, by Dr. W. H. Smith.

Attica, Mich., Feb. 7, 1914.—Investigating smallpox, by Dr. W. H. Smith.

Meridian, Mich., Jan. 22, 1914.—Investigating smallpox, by Dr. H. S. Bartholomew.

St. Johns, Mich., Jan. 28, 1914.—Investigating smallpox, by Dr. H. S. Bartholomew.

Ferry, Mich., Jan. 24, 1914.—Investigating smallpox, by Dr. George S. Williams.

Pipestone Twp., Berrien Co., Mich., Feb. 1, 1914.—Investigating smallpox, by Dr. C. N. Sowers.

Fowler, Mich., Feb. 5, 1914.—Investigating smallpox, by Dr. H. S. Bartholomew.

Lansing, Mich., Feb. 15, 1914.—Investigating suspected smallpox, by Dr. H. S. Bartholomew.

Boyne Falls, Mich., Feb. 9-11, 1914.—Investigating measles, by Dr. S. Szudrawski.

Benton Twp., Berrien Co., Mich., Feb. 5, 1914.—Investigating smallpox, by Dr. C. N. Sowers.

Portsmouth Twp., Bay Co., Mich., March 16-19, 1914.—Investigating scarlet fever, by Dr. E. Goodwin.

Olivet, Mich., Feb. 26, 1914—Investigating smallpox, by Dr. H. S. Bartholomew.

Northville, Mich., March 24, 1914.—Investigating smallpox, by Dr. Guy L. Kiefer.

Ypsilanti, Mich., March 30, 1914.—Investigating smallpox, by Dr. Guy L. Kiefer.

Winsor Twp., Eaton Co., April 5, 1914.—Investigating scarlet fever, by Dr. H. S. Bartholomew.

Marine City, Mich., Feb. 14, 1914.—Investigating scarlet fever, by Dr. W. H. Smith..

Kenockee Twp., near Goodells, Mich., April 28, 1914.—Investigating smallpox, by Dr. W. H. Smith.

Burlemont, Mich., April 28, 1914.—Investigating smallpox, by Dr. C. N. Sowers.

Breckenridge, Mich., March 30, 1914.—Investigating smallpox, by Dr. Thomas M. Koon.

White Pigeon, Mich., May 2, 1914.—Investigating diphtheria, by Dr. C. N. Sowers.

Merritt Twp. and Portsmouth Twp., Bay Co., Mich., April 14, 1914.—Investigating scarlet fever, by Dr. E. Goodwin.

Auburn, Mich., April 25 to 28, 1914.—Investigating diphtheria, by Dr. E. Goodwin.

Laingsburg, Mich., June 15, 1914.—Investigating diphtheria, by Dr. H. S. Bartholomew.

DIVISION OF SANITARY ENGINEERING.

ANNUAL REPORT OF THE STATE SANITARY ENGINEER FOR 1914.

Dr. John L. Burkart, Secretary State Board of Health.

Dear Doctor:—I herewith hand you my report for the year ending June 30, 1914:

WATER SUPPLY AND SEWAGE DISPOSAL.

Act 98, Public Acts 1913, as published on pages 30-32 inclusive of the report of the Michigan State Board of Health for 1913, became effective August 14, 1913.

Section 1 of this act gives the State Board of Health supervisory and visitorial power and control over all corporations, both municipal and private, engaged in furnishing water to the public for household or drinking purposes.

Section 3 gives the Board authority to make and enforce rules for the conduct of such water supplies and to make and enforce penalties for non-compliance with the same.

Section 6 requires the mayor of each city and the president of each village, in the case of municipal corporations, and all private corporations to file with the State Board of Health complete maps and descriptions of their water supplies, also plans and descriptions of all changes in the same made from time to time.

Section 8 requires the filing with the State Board of Health of an annual report on the operation of water filtration plants.

Section 10 authorizes the State Board of Health to order such changes in any water supply system as it may deem necessary for the protection of the public health.

Section 11 gives the State Board of Health the same power and control over the sewerage and sewage disposal systems of the state as is given over water systems in the previous sections.

Section 12 creates the office of State Sanitary Engineer and defines his duties.

The above act marks a distinct step in advance and puts Michigan in a class with a few states which have exhibited positive progressive tendencies in health legislation and far beyond the position taken by most of the states thus far. Some objections were raised to the passage of Act 98 on the ground that it would interfere with home rule and concentrate too much power in a central authority but the more advanced thought for the public welfare prevailed. In the administration of the work of the Engineering Division, it is the desire to be helpful to the various communities in solving their problems rather than to exhibit a show of authority and make an attempt to revolutionize sanitary construction. It is believed that more can be accomplished by conference and arbitration than by compulsion and that

the services of the State Sanitary Engineer, in an advisory capacity, should be available to any community for the purpose of pointing the way toward improved sanitary conditions, by avoidance of errors, due to lack of familiarity with current engineering practice. The appreciation felt and freely expressed by municipalities already assisted in their local affairs forms no small part of the reward enjoyed by the members of the engineering staff.

The question of the pollution of streams and lakes by the indiscriminate discharge into them of sewage and trade wastes has already become important and will continue to become more so as the density of population increases, unless general measures are taken to check contamination by a proper treatment of waste liquids. A healthy sentiment in this regard is already springing up among our citizens but it has hardly yet progressed to the point where it is easy to obtain appropriations for sewage treatment work in the absence of special conditions demanding remedy. It is confidently expected that ere long the riparian municipality will have sufficient regard for its neighbor below, who may be using the stream for a water supply, to realize that it should bear its proportionate share of the responsibility and treat its waste to such an extent as not to place an unreasonably heavy burden on a filter plant below. Discharge into water is the final act in all methods of sewage disposal, but local conditions determine in each case what treatment must precede the final step.

The slight slopes of the ground, so common in Michigan, together with lack of fall in many of our streams, as well as the prevalence of county drainage ditches, which are dry or nearly so during a portion of each year, all add to the complications our municipalities have to contend with and render our problems very different from those encountered in many of the states, particularly in the east.

If the public mind were as seriously concerned with the purity of drinking water, or rather with the possibility of its becoming contaminated, as it seems to be regarding stream pollution, we should feel considerably better satisfied. Unfortunately, many of our citizens and public officials seem to think that well waters are always safe and that any water that is clear, sparkling, cool and pleasant to the taste is pure. Too many people are likely to assume that if a certain water has been tested and found safe, it is forever exempt from suspicion and that no more examinations are necessary. We often feel called upon to express the opinion that one favorable result means practically nothing while one unfavorable one is sufficient to condemn the supply.

Evidently much education of the public along these important lines is necessary.

THE DISPOSAL OF GARBAGE AND OTHER MUNICIPAL WASTES.

The municipalities of Michigan are lamentably backward in the attention they are giving to the disposal of ashes, garbage, rubbish and street sweepings. In this regard very few of them have reached the state of development attained by eastern cities of corresponding size thirty to forty years ago. The maintenance of a common dump for these various forms of waste is a disgrace to our modern civilization. The dump is, of course, the logical place for some wastes but to draw no distinction is unworthy of our present stage of advancement and a graphic display of neglect or disinclination to assume responsibility for the settlement of questions which are often vex-

atious, yet important and necessary to the progress of decency, comfort and convenience and indirectly, at least, to the preservation of public health.

The manner of collection has as much sanitary significance as the method of disposal. Any system which fails to encourage household cleanliness throughout the whole year and among all classes of inhabitants falls very far short of accomplishing the results which ought to be demanded by an interested public. No collection system which is not paid for out of the tax levy and thus made available to rich and poor alike, on an equal basis, can possibly meet all sanitary requirements.

We hope to be of assistance in building up a desire for more systematic, sanitary, efficient and agreeable methods of waste collection and disposal.

NUISANCES.

The law makes the abatement of nuisances a matter to be administered by the local board of health, but many health officers and officials of small communities are often at loss to know how to prevent the recurrence of the nuisance, once it is eliminated. They are frequently reluctant to proceed for fear of hurting the feelings of their friends or neighbors and are not always sure what constitutes a nuisance. Visits of inspection, instruction and consultation are always made in nuisance cases when there is a probability that we can be of service. Many local officials, who would otherwise be exceedingly slow and inefficient, are willing and prompt to act when advised and supported by the authority of the State Board of Health.

WORK OF THE ENGINEERING DIVISION.

From July 1, 1913, to August 14, 1913, the Sanitary Engineering work of the Board was carried on, as previously, under the designation of "Medical Inspection" as provided in Act 293, Public Acts 1909, with Professor Edward D. Rich, of the University of Michigan, in charge and Henry F. Vaughan, his assistant. On August 14, 1913, Mr. Rich became State Sanitary Engineer, Mr. Vaughan continuing as Acting Medical Inspector until January 1, 1914, when he was succeeded by F. Gardner Legg. On January 22, 1914, Don W. Bingham was appointed an additional Acting Medical Inspector. With this force and the necessary clerical help, the work of the year was completed.

FILING PLANS OF WATER AND SEWER SYSTEMS.

For the purpose of systematizing the collection of data concerning the water supply and sewerage systems of the state, sheets of instruction for the preparation and submission of plans of such systems have been furnished each incorporated municipality, together with question sheets on the same subjects designed to enable them to forward complete and uniform information easily and promptly. These rules and blanks are as follows:

STATE OF MICHIGAN,
DEPARTMENT OF THE STATE BOARD OF HEALTH.
DIVISION OF SANITARY ENGINEERING.

PUBLIC WATER SUPPLY.

Rules and Regulations for the Preparation and Submission of Plan of Water Supplies and Purification Works.

In accordance with Sec. 6, Act No. 98, Public Acts 1913, and Sec. 3, Act No. 81, Public Acts 1873, providing for the submission of plans of public water supplies and purification works and relating to rules of the State Board of Health, the following rules and regulations have been adopted by the State Board of Health covering the preparation and submission of plans of public water supplies, purification works and extensions and alterations of the same.

All maps of distribution systems must be drawn to a scale of 300 feet to one inch or larger, on tracing cloth, or a blue print of the same, or on substantial and tough drawing paper. They must be neatly and accurately drawn to scale. Lithographs, printed cuts, photographic reproductions or free hand sketches will not be accepted in lieu of maps. All detail plans of reservoirs, elevated tanks, standpipes, purification works, dams, collecting systems or other structures must be drawn to a scale sufficiently large to show all the details of construction in a clear and concise manner, on cloth or paper as specified above for distribution systems.

All maps of distribution systems must show, in solid lines, all streets and alleys; all water mains now in existence, marked with figures in such a way as to clearly designate the sizes of pipe and where the various sizes begin and end; and the location of all pumping stations, intakes, reservoirs, standpipes, elevated tanks, fire hydrants, valves, gates and blow-offs.

A title must be placed on each map and on all other plans, clearly stating the name of the city or village, the county, and the name of the department, institution, corporation, firm or person owning or having control of the water supply.

The scale of the map and plans must be clearly shown and the points of the compass indicated.

The location of all streams, outlets of sewers and other possible sources of contamination within five miles of the waterworks intake must be shown with reference to the intake or source of supply.

All lettering and figures must be of appropriate size and distinct outline, and all plans, maps and drawings executed in a neat and workmanlike manner by a competent person accustomed to such a class of work.

All maps, plans and drawings must be submitted in duplicate, signed by the engineer or draughtsman who made them and by the authorities having the works in charge.

For additional instructions specifying what structural details are required in each case, see question sheet on Public Water Supply.

Secretary, State Board of Health,
Lansing, Mich.

STATE OF MICHIGAN,

DEPARTMENT OF THE STATE BOARD OF HEALTH.

DIVISION OF SANITARY ENGINEERING.

SEWERAGE AND SEWAGE DISPOSAL.

Rules and Regulations for the Preparation and Submission of Plans of Sewerage and Sewage Disposal.

In accordance with Sec. 11, Act No. 98, Public Acts 1913 and Sec. 3, Act No. 81, Public Acts 1873, providing for the submission of plans of sewerage and sewage disposal and relating to rules of the State Board of Health, the following rules and regulations have been adopted by the State Board of Health covering the preparation and submission of plans of sewerage systems and sewage disposal and of alterations and extensions of the same.

GENERAL PLANS.

Sewerage systems must be filed as general plans, drawn to a scale of 300 feet to one inch or larger, on tracing cloth, or a blue print of the same, or on substantial and tough drawing paper. These plans must have shown upon them all existing streets, alleys, water courses, streams, lakes, ponds, schools and public buildings within the city or village limits. Sewers should be shown on all streets or alleys in the municipality or sewerage district even if the construction of some of the sewers is to be deferred. The term "sewer" as used herein is to be understood to mean any conduit carrying household or industrial sewage either alone or accompanied by storm water but does not include drains for surface water only.

Should there be areas which, on account of topographical or other reasons, can not drain into the main system, their limits must be clearly shown, the reasons plainly set forth and the future drainage of such territory discussed.

All existing or proposed outlets and overflows must be shown and the location of present or proposed disposal works indicated with the land available for this purpose outlined.

If the area to be mapped is too large to be plotted at the scale mentioned above on a sheet twenty-four by thirty-six inches it may be divided into as many sheets not exceeding this size as are necessary. If more than two such sheets are required an index map must be provided to show how the sheets fit together.

A title must be placed on each sheet clearly stating the name of the city or village, the county and the name of the department or city official having charge of sewer work. The scale of the map, points of the compass, city or village limits and the date must be clearly shown.

The character of map work desired and the method of placing information on the same is shown by the cut on the following page.

All plans are to be submitted in duplicate, signed by the engineer or draughtsman who made them and by the authorities having the work in charge.

LETTERING, LINES AND SYMBOLS.

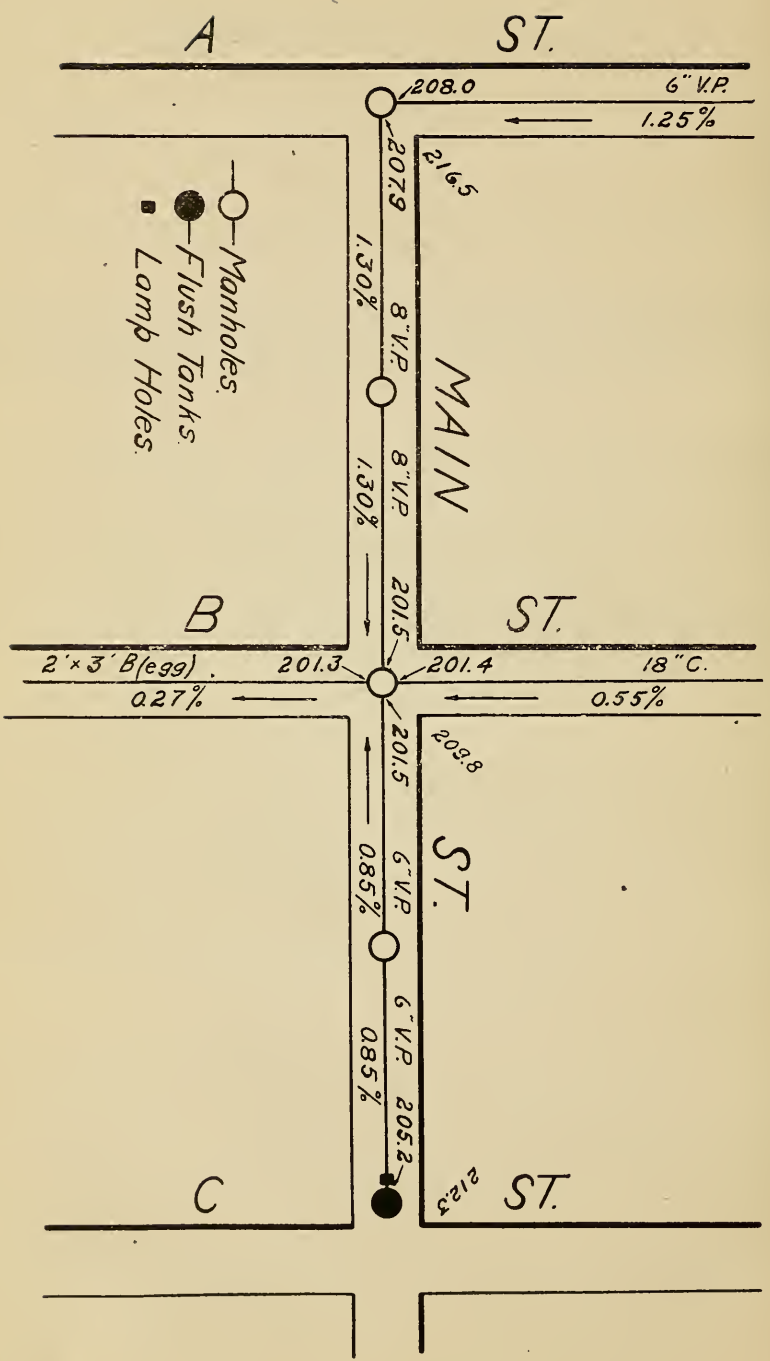
Letters and figures must be clear and distinct and of appropriate size. All map and plan work must be executed in a neat and workmanlike manner by a competent person accustomed to such a class of work.

Sewers now built should be drawn in solid lines and those to be constructed later in broken lines. If sanitary sewers and combined sewers both appear on the maps distinguishing lines must be used for each.

All manholes must be shown by plain circles and flush tanks by circles filled in. Other appurtenances must be shown by appropriate symbols properly referenced by a legend near the title.

The sizes and material of all sewers must be plainly marked in letters and figures and the points where the various sizes begin and end clearly shown.

The following abbreviations should be used for the materials used in sewer construction: "V. P."—Vitrified pipe, crock, clay pipe, terra cotta, glazed tile; "C"—Cement pipe, cement tile, concrete; "B"—Brick; "W"—Wood, plank; "I. P."—Iron pipe.


A
ST.
208.0
6" V.P.
1.25%
207.9
216.5
1.30%
8" V.P.
MAIN
8" V.P.
1.30%
201.5
B
ST.
2'x3' B(egg)
201.3
201.4
18" C.
0.27%
0.55%
201.5
209.8
ST.
0.85%
6" V.P.
6" V.P.
0.85%
205.2
212.3
C
ST.
Manholes.
Flush Tanks.
Lamp Holes.

ELEVATIONS AND GRADES.

The surface elevation must be marked in figures at each street intersection and at all points along existing or proposed sewer lines where a change of slope occurs. Elevations of the surface at intersections should be placed outside the street lines in the upper right angle. Surface elevations between intersections should be placed outside the street lines and above the points to which they refer.

Elevations of sewer inverts should be placed inside the street lines with an arrow indicating the point to which they refer. Elevations of sewer inverts must be shown at all manholes, for each inlet and outlet, at all breaks in grade and at all sewer ends. All elevations must be shown to the nearest tenth of a foot at least.

All sewer gradients must be shown in figures indicating the per cent of grade or fraction thereof and the direction of flow marked with an arrow. Gradients, arrows, material and invert elevations should be placed parallel to the sewer line to which they refer.

The elevation of sewer outlet, overflows, disposal works, as well as that of high water and low water level of all streams and other bodies of water at points of overflow or outlet of sewage must be plainly marked in figures and the direction of flow of all streams indicated. All elevations used must refer to the same datum.

PROFILES.

Sewer profiles are not required to be filed, but this Department reserves the right to call for such profiles as may seem to be necessary to a proper solution of any question involved.

DETAIL PLANS.

Detail drawings of sewer sections, except where vitrified, cement or iron pipe is used, and of all sewer appurtenances, such as manholes, lampholes, flush tanks, house connections, siphons, overflows, and all other general or special structures shall accompany the general sewer plans. They shall be supplemented by sufficient explanatory notes to indicate clearly the character of construction.

The detail plans shall be drawn to a scale large enough to clearly show the nature of the design and all dimensions of each structure.

Drawings of disposal works shall be made in sufficient detail to give a clear understanding of the working of each unit of the plant and the relation of its size to the work required of it. They should show the distributing and drainage systems, arrangement of any automatic devices and the sizes of stone, sand or gravel used for filtering material.

All detail plans must be provided with a suitable title showing the name of the municipality, and county; the scale or scales, date, and name of the designing engineer. Explanatory notes sufficient to make clear all the conventions of the drawings and methods of design and operation should be included.

Secretary, State Board of Health,
Lansing, Mich.

STATE OF MICHIGAN,

DEPARTMENT OF THE STATE BOARD OF HEALTH.

DIVISION OF SANITARY ENGINEERING.

PUBLIC WATER SUPPLY.

LOCATION.

.....
(Name of city or village.) (County.)

To the Secretary of the State Board of Health,

Lansing, Mich.

DEAR SIR—In conformity with Act No. 98, Public Acts 1913, the undersigned, representing.....
(Name of department, institution. corporation or person owning or controlling the water supply.)

in the location above named, hereby submit the following information and description of the said supply, the same being explanatory and supplementary of plans now submitted,

heretofore forwarded or about to be filed in the office of the Secretary of the State Board of Health.

NOTE.—The following questions are so framed as to meet the requirements of widely varying conditions. In case any of the questions do not apply to your water supply, the answers to such questions may be omitted; except that answers to all questions are desired whenever possible. Where the term "city" is used the term "institution," "company," etc., may be substituted.

GENERAL.

1. Does the supply constitute:
   (*a*) A complete and distinct system in itself?.....
   (*b*) Are extensions or additions contemplated?.....
   If so, give a description of what is proposed, including the probable location of the same, referring to the map, as well as an estimate of the date when such extensions will become necessary.....
2. Give the population of the city at the present time.....
3. Give the date when the supply was originally installed.....
4. Give dates and descriptions of subsequent extensions, if any.....
5. Is there now or will there be an auxiliary supply for emergency use, as in case of large fires?.....
   If so, describe the source of such supply, the connection of the same with the pumping plant, and the conditions under which it is to be used:.....

SOURCE OF SUPPLY.

Surface Water Supply.

1. If the supply is taken from a stream give the following information:
   (*a*) Name of stream.....
   (*b*) Drainage area above the intake, in square miles.....
   (*c*) Approximate minimum flow of the stream in cubic feet per second.....
   (*d*) Location of the intake with reference to the drainage outlets of the city. (This should include streams and dry runs as well as sewers and may be answered by referring to the map.).....

NOTE.—The map filed with the Secretary of the State Board of Health should show the general layout, together with plans of intake, suction line, dam, intake well and all other devices used in taking water from the stream.

2. If the supply is taken from a natural lake, give the following information:
   (*a*) Name of lake.....
   (*b*) Size of lake, in acres.....
   (*c*) Average depth of lake.....
   (*d*) Drainage area of streams supplying the lake, in square miles.....

NOTE.—The map filed with the Secretary of the State Board of Health should show the general layout, together with plans of intake, suction and delivery pipe lines, intake well, and all other devices used in taking water from the lake.

3. If the supply is taken from an artificial impounding reservoir, give the following information:
   (*a*) Area of water surface when the reservoir is full, in acres.....
   (*b*) Maximum and average depth of the water in the reservoir, when full: Maximum.....; Average.....
   (*c*) Approximate capacity of reservoir when full, in gallons.....
   (*d*) Approximate quantity usually stored during the low water season in gallons....
   (*e*) Name of the stream tributary to the reservoir.....
   (*f*) Drainage area of the same in square miles.....
   (*g*) Average yearly rainfall over the drainage area, in inches.....
   (*h*) Nature of the drainage area: per cent of tilled land.....; per cent of grass land.....; per cent of timbered land.....
   (*i*) Are there any camping, picnic, or any other public or semi-public grounds upon the drainage area?..... If so, describe each in detail.....
   (*j*) What measures are used or proposed for protecting the supply from contamination?.....
   (*k*) Submit a map of the drainage area, showing the location of all public roads and railroads; all residences, feeding yards for stock, and picnic or camping grounds within the limits of the area.

Ground Water Supply.

4. If the supply is taken from wells, give information as follows:
   (*a*) Number of wells used at present.....
   (*b*) Diameter and depth of each (designate wells by number).....
   (*c*) Character and thickness of each stratum of material passed through in sinking the wells, counting from the surface.....
   (*d*) Description and depth of stratum, or strata, from which the supply of water is obtained.....
   (*e*) If wells are drilled or bored, state material of casing employed to prevent entrance of surface water or of shallow ground water.....
   (*f*) If wells are dug, state material used for walls, and method of sinking.....
   (*g*) State means employed to facilitate the entrance of water into the well from the water-bearing stratum. If some patented form of strainer is used, give its name..
   (*h*) Give results of any tests that have been made to determine the yield of the wells, or any data that might be used in estimating such yields.....
   (*i*) Furnish a large scale map showing the general layout of wells, detail plans of the construction of the same with their suction or siphon connections and any explanatory notes that may be necessary.
5. If the supply is derived from springs, furnish information as follows:
   (*a*) Character and thickness of the stratum from which the springs apparently flow.....
   (*b*) Results and description of any measurements or tests that have been made to determine the yield of the springs, or any data that might be used in estimating such yield.....
   (*c*) Furnish a large scale map showing the general layout of springs and the location of any possible sources of contamination, also plans of whatever collecting chambers, tunnels, weirs and conduits are used to collect or store the water from the springs and to convey it to the city.
6. In case the supply is collected from an underground source by means of filter galleries, collecting pipes or tunnels, or similar devices, furnish the following information:
   (*a*) Description and depth of stratum, or strata, from which the supply is collected.
   (*b*) Character and thickness of each stratum of material encountered, from the surface of the ground down to the stratum from which the water is obtained.....
   (*c*) Give the results and description of any tests that have been made to determine the yield of water from the structure or any data that might be used in estimating such yield.....
   (*d*) Furnish a large scale map showing the general layout of the collecting system, together with plans of collecting pipes, tunnels or galleries, and of whatever weirs, conduits and other devices are employed.
7. Are there any cess-pools or other possible sources of pollution within 600 feet of the site of the supply?.....
   If so, specify each, or show its location on a map.....
8. Are there any salt or oil wells in the neighborhood that would be likely to injure the supply?.....
   If so, give the depth to the salt-bearing stratum.....

PURIFICATION.

1. In case the water is purified or treated in any way, including storage or sedimentation, previous to its delivery to consumers, furnish a brief statement of the general nature of the purification or treatment process employed.....
2. What is the future estimated daily consumption upon the basis of which the purification or treatment plant was designed?.....
3. In case the water is clarified in settling basins, either with or without the use of chemical coagulant, furnish information as follows.
   (*a*) Are the settling basins operated upon the "continuous flow" plan, or upon the "fill and draw" plan?.....
   (*b*) What is the gross holding capacity of the settling basins, in gallons, at the ordinary working level?.....
4. In case the water is filtered, furnish information as follows:
   (*a*) General type of filter used.....
   (*b*) Number and size of filter units.....
   (*c*) Filter sand used, character and thickness.....
   (*d*) Head of water maintained above level of filter sand.....
   (*e*) Means used for maintaining this head.....
   (*f*) Normal rate of operation of filters, in gallons per acre per day.....

(*g*) Means employed to maintain this rate.....
(*h*) Maximum "loss of head" which is allowed in the filter before it is washed....
(*i*) Means employed to show this "loss of head," and to indicate to the attendant when the filter should be washed.....
(*j*) Method employed in washing the filters.....
(*k*) Capacity of filtered water reservoir.....
(*l*) How is this reservoir covered?.....

5. In case a chemical coagulant is used to assist in the clarification or filtration process, or in both, furnish information as follows:
(*a*) Means employed in dissolving the coagulants, and in securing and maintaining a solution of known strength.....
(*b*) Method of determining in advance the amount of coagulant necessary for a day's run, or for a portion of a day's run.....
(*c*) At what point or points is this solution introduced into the water?.....
(*d*) By what means is the amount of solution so introduced regulated?.....
6. Are regular chemical and bacteriological analyses made for the purpose of controlling the operation of the plant?.....
If so, by whom?.....
7. Does the attendant make any written record of the operation of the purification plant; particularly with reference to the condition of the raw water, the amount of coagulant used, the rate of operating the filters, the times of washing the filters, and the like?.....
8. In case the supply is sterilized by hypochlorite of lime or hypochlorite of soda give the following information:
(*a*) Date of installation of chlorinating apparatus.....
(*b*) Description of solution mixer.....
(*c*) Description of solution storage tanks.....
(*d*) Description of method of regulating the flow of the solution.....
(*e*) At what point is the solution introduced into the water supply.....
(*f*) If the solution enters the suction main describe the method used to overcome the vacuum of the same.....
(*g*) Is the hypochlorite of lime or of soda used?.....
(*h*) Quantity used per million gallons, maximum....., average....., minimum.....
(*i*) How do you decide on the proper quantity to be used?.....
(*j*) What tests of the strength of the chemical are made?.....
(*k*) How often are they made?.....
(*l*) Have you had any complaints of bad taste in the water?.....
If so, under what circumstances are they most numerous?.....
(*m*) How often are bacterial analyses made to determine the efficiency of the process?.....
(*n*) Who makes such analyses for you?.....
(*o*) Give a summary of the results of such analyses.....
9. In case it is proposed to use any purification or treatment process other than, or in addition to any of the above, furnish complete information about the process and the devices to be used in its operation.....
10. Furnish general plans of the purification plant, showing relative locations and elevations of settling basins, filters, coagulant tanks, filtered water reservoirs, flood protection arrangements and other general features of the plant, and indicating all pipe connections. Also, furnish detail drawings in all cases in which these are essential to the proper understanding of the plant.

PUMPING AND DISTRIBUTING.

1. In regard to pumping the supply, furnish information as follows:
(*a*) How many times does the water have to be pumped?.....
(*b*) Type of pumps used.....
(*c*) Size of each, or, nominal capacity in gallons per minute.....
(*d*) Date of installation of pumps.....
(*e*) Estimate the total length of time since installation each pump has been in use, that is, equivalent continuous usage.....
(*f*) Condition of pumps at present time.....
(*g*) Suction lift, in feet: ordinary.....; maximum.....
(*h*) Head, in feet, against which the water must be pumped, under ordinary conditions.....
(*i*) Give results and description of any tests which may have been made to determine the slip of the pumps.....

2. In regard to the pipe system for distributing the supply, furnish information as follows:
   (*a*) Size, length and kind of pipe in suction line to pumps.....
   (*b*) Size, length and kind of pipe in force mains to settling basins, service reservoir, elevated tank or stand-pipe.....
   (*c*) Total length of *each* size of pipe in entire system:

4-inch.....feet	10-inch.....feet	....inches.....feet	
6-inch.....feet	12-inch.....feet	....inches.....feet	
8-inch.....feet	....inch.....feet	....inches.....feet	
		Total.....feet.	

   (*d*) Is any portion of the pipe system carried over a stream on a bridge, or otherwise exposed?.....
   If so, give methods used to prevent freezing.....
   (*e*) Total number of fire hydrants in the system.....
3. In case an elevated tank or a standpipe is used, give the following information:
   (*a*) Diameter and height, in feet.....
   (*b*) Capacity, in gallons.....
   (*c*) Height of high water level of tank or standpipe above foundation.....
   (*d*) Height of high water level of tank or standpipe above business section of city..
   (*e*) Height of high water level of tank above highest residence section of city.....
   (*f*) How is the tank or standpipe covered?.....
   (*g*) Is any provision made to cut out the tank or standpipe in case of fire, and operate under direct pump pressure?.....
4. In case a service reservoir other than an elevated tank or standpipe is used, give information as follows:
   (*a*) Shape, dimensions and capacity when full.....
   (*b*) Height of water level, when reservoir is full, above business section of the city..
   (*c*) Height of water level above highest residence section of city.....
   (*d*) Is any provision made to cut out the service reservoir in case of fire, and operate under direct pump pressure?.....

AUTHORITY.

To whom should future correspondence be addressed?.....
(Signed).....
.....

STATE OF MICHIGAN,
County of....., ss.

Subscribed and sworn to before me, a notary public in and for said county and state, this.....day of.....191....

.....
Notary Public.

(My commission expires.....)

[SEAL.]

STATE OF MICHIGAN,

DEPARTMENT OF THE STATE BOARD OF HEALTH.

DIVISION OF SANITARY ENGINEERING.

SEWERAGE AND SEWAGE DISPOSAL.

LOCATION.

.....
(City or Village.) (County.)

To the Secretary of the State Board of Health,
Lansing, Mich.

Dear Sir:—

In conformity with Act No. 98, Public Acts 1913, the undersigned hereby submits the following information concerning the sewerage and sewage disposal of the.....
(City or Village.)
of....., above named, the same being explanatory and supplementary of plans now submitted, heretofore forwarded or about to be filed in the office of the Secretary of the State Board of Health.

NOTE.—The following questions are so framed as to meet the requirements of widely varying conditions. In case any of the questions do not apply to your city or village, the answers to such questions may be omitted; except that answers to all questions are desired whenever possible.

GENERAL.

1. Are the sewers now in use constructed entirely on the "combined" or on the "separate" plan.....or,
2. Is the system a combination of the two plans?.....
3. Does the present system cover the city as a whole or only certain districts?.....
4. Give the population of the city at the present time.....
5. If the population served by the sewer system is not the same as that of the entire city, give the population served by sewers at the present time.
6. Show on the map of the system the boundaries of the land served by the present system.

SEWERS.

1. Give a statement in tabulated form of the length in feet of all the various sizes of sewers in use as follows:

8-inch	feet.	20-inch	feet.
10-inch	feet.	24-inch	feet.
12-inch	feet.	.....	feet.
15-inch	feet.	.....	feet.
18-inch	feet.	.....	feet.
		Total	feet.

2. Give a statement in tabulated form of the length in feet of sewers of various materials as follows:

Vitrified pipe	feet.	Brick sewer	feet.
Cement pipe	feet.	Concrete sewer	feet.
Iron pipe	feet.	Wood sewer	feet.
.....	feet.	.....	feet.

3. (*a*) Number of manholes.....(*b*) Number of lampholes.....
   (*c*) Number of flush tanks.....(*d*) Number of street inlets.....,
   (*e*) Number of catch basins.....(*f*) Special structures.....
   (*g*) Average distance between manholes on pipe sewers.....
   (*h*) Average distance between manholes on large sewers.....
4. Describe the means provided for ventilating the sewer system.....
5. Describe the means used for flushing lateral sewers if automatic flush tanks are not provided.....;
6. Describe the means used, if any, for flushing main sewers.....

SEWAGE.

Amount of House Sewage.

1. Give the following information concerning the estimated use of sewers:
   (*a*) Probable number of houses connected with the system.....
   (*b*) Probable percentage of houses tributary to sewers already built which are not connected.....
   (*c*) Probable total number of office buildings, stores, hotels, restaurants, shops and other general business buildings now connected with the system.....
   (*d*) Probable percentage of such structures, tributary to sewers already built which are not connected.....
   (*e*) Factories, railroad shops, creameries, tanneries, refineries, packing houses, laundries, ice plants, or other important industrial plants now connected; specify each in detail.....
   (*f*) Probable number of same likely to be connected in the future; specify each in detail.....
2. Including both residential and business buildings, but not including railroads and other industrial establishments using large amounts of water, what is the average amount of water used per service connection in the city, in gallons per day?.....
3. Give the estimated amount, in gallons per day, of sewage contributed to the system by the various industrial establishments, indicating each one separately. If not possible to do this, give data concerning the kind, size and operation of such plants, from which the volume of the flow of sewage may be estimated.....
4. State the approximate length of sewers that are below the ordinary or occasional ground-water level, as follows:
   Length below the present permanent ground-water level, and thus subject to infiltration practically all the time.....
   (*b*) Length below the temporary ground-water level, and thus subject to infiltration only during wet weather periods.....
5. In case the system is built on the "separate" plan, state whether or not any tests or measurements have been made for the purpose of determining the amount of ground-water or storm-water finding its way into the sewers.....
6. In case the system is built on the "separate" plan, is rain water from roofs, paved courtyards or cistern overflows, or seepage water from subsoil drains admitted to the sewers?.....
7. Are the sewers underdrained, either in whole or in part?.....
   If so, state what parts.....
8. By whom are house connections built and what precautions are enforced to guard against leakage in the same?.....
9. Size of house connections.....
10. Approximate average number of stoppages per year which have been brought to the attention of the department:
    (*a*) In house connections.....
    (*b*) In the sewers.....
11. What has been the chief cause of such stoppages:
    (*a*) In house connections.....
    (*b*) In the sewers.....

STORM WATER RUN-OFF.

1. In case the existing sewers, or any of them, are built on the "combined" plan, give the following information regarding the estimated storm water flow:
   (*a*) Describe briefly the general character of the surface drained; whether porous or impervious; rocky or sandy, clayey, loamy, etc.; rough or smooth.....
   (*b*) State the formula used in computing the estimated run-off; or, if no formula or diagram was used, state the method employed in arriving at an estimate.....
   (*c*) Give the location of each storm-water overflow included in the system, especially with reference to the water supply intake, with detail plans and description, and with an estimate of the flow necessary to cause the sewer to overflow at such point.....

PUMPING.

1. In case any or all of the sewage is pumped, submit plans and a complete description of the pumping station, including size of suction and force mains, and sufficient data regarding size, speed and running time of pumps so that the yearly, daily and hourly rate of pumping can be computed.....

SEWAGE TREATMENT AND DISPOSAL.

1. In case settling, septic or chemical precipitation tanks are in use, give the following information:
   (*a*) Number of tanks.....settling.....septic.....chemical.....
   (*b*) Average daily quantity of sewage treated.....
   (*c*) Average length of time the sewage remains in the tanks.....
   (*d*) Disposal of the effluent.....
   (*e*) Disposal of sludge.....
   (*f*) Volume of sludge produced per million gallons of sewage treated.....
   (*g*) How often are the tanks emptied?.....
   (*h*) Average depth of sludge when emptied.....
   (*i*) Thickness of scum when emptied.....
   (*j*) Submit detail plans of all tanks with full dimensions showing connections and method of operation of all alternating or dosing apparatus and all other devices employed.....
2. In case the sewage is treated by any form of filter, give the following information:
   (*a*) Date of construction.....
   (*b*) Describe the process in use.....
   (*c*) Total net filtering area in acres.....
   (*d*) Average area of beds in acres.....
   (*e*) Number of beds.....
   (*f*) Is the filtering medium sand or natural soil?.....
   (*g*) What is the depth of the filtering medium?.....
   (*h*) Describe the system of underdrains (depth, size and distance apart, outlet, etc.).....
   (*i*) Average daily quantity of sewage treated per acre.....
   (*j*) How long does sewage flow on each bed?.....
   (*k*) How long is each bed allowed to rest?.....
   (*l*) Describe in detail the method of caring for the surface including the amount of material removed per year and its disposal.....
   (*m*) Are any crops raised on the filters; if so, what kind?.....

FINAL DISPOSAL.

1. Give the name of the stream or other body of water into which the sewer outlet or outlets discharge.....
2. Is there a dam across the stream? If so, where with respect to the sewer outlets.....
3. Does the backwater from any dam below the sewer extend up stream as far as any sewer outlet?
4. Estimate as nearly as possible the average low-water width and depth of the stream near the sewer outlets and its average rate of flow.....
5. In case of the present or prospective use of this stream for water supply; state by what city, institution, company or individual and give the distances of the intakes of the same below the sewer outlet by way of the stream.....
6. In case of present or prospective use of this stream for a public water supply above the sewer outlet; state by whom, and give the distance of the intake above the sewer outlet, and whether possible under any condition for sewage to reach the intake....

AUTHORITY.

To whom should future correspondence be addressed?.....
(Signed).....
.....

STATE OF MICHIGAN, COUNTY OF.....ss.
Subscribed and sworn to before me, a notary public in and for said county and state, this.....day of.....191....
.....
Notary Public.
(My commission expires.....)
[SEAL]

The filing of plans in compliance with the law has been rather slow for various reasons but most of the the towns have shown a disposition to be prompt in the matter. Many of them are not in possession of all the required information and more or less time is required to collect it by means

of surveys; others are reluctant to pay for the services of an engineer for this purpose and do not realize that this local knowledge will be even more valuable to them than to us; a few have completely lost their records by fire or otherwise, while a small number have ignored the requirements of the law as well as our requests for action. The present status of this work is shown in tables hereto attached, Nos. 1 to 12, inclusive.

EXAMINATION OF PLANS FOR PUBLIC BUILDINGS.

The law requires that plans for all construction and alteration of public buildings be approved by the State Board of Health. Table No. 13 shows a list of plans recommended for approval.

CONFERENCES, CONSULTATIONS AND INSPECTIONS.

Table No. 14 gives a complete list, alphabetically arranged, of visits made during the year for the purpose of assisting municipalities or city officials in solving their local problems of sanitation. Many of these investigations were of minor importance and deserve no special comment but those of greater moment or interest are treated somewhat at length in the following paragraphs:

1. Alpena Water Supply.—The 1913 report of the Michigan State Board of Health merely mentions the fact that three inspections were made during 1913 at Alpena in connection with an epidemic of typhoid fever. As the problem apparently had its inception when the position of the water intake was changed in 1907 or 1908, it seems proper that the investigations of 1913 should be outlined briefly.

Dr. Allan J. McLaughlin in 1912, published findings relative to the high winter typhoid rate at Alpena in his "Sewage Pollution of Interstate and International Waters" (Bulletin No. 83, Hygienic Laboratory, United States Public Health and Marine Hospital Service, Washington, pp. 216-221) in which he held the water supply responsible and laid the cause specifically to the use of inferior water from the so-called "Inner Intake" during ice conditions.

On February 15, 1913, the Secretary of the State Board of Health, Dr. R. L. Dixon, and the State Sanitary Engineer, Edward D. Rich, visited Alpena and, after investigation, laid the then existing outbreak to the water supply and recommended the installation of an emergency hypochlorite plant. This recommendation resulted in the construction of such a plant. A second investigation by the State Sanitary Engineer was made on the 11th and 12th of April, 1913, in which he found that the precautions relative to the care of typhoid fever patients were not well understood and recommended the appointment of an emergency inspector to give instructions. The quality of the milk supply, particularly that derived from the "one cow" men was questioned in this second report.

Dr. Guy L. Kiefer, of Detroit, made an investigation May 13-15, 1913, from which he concluded that of forty-five cases reviewed, eighteen were water-borne and twenty-seven due to direct contact with the water-borne cases. Of these eighteen water-borne cases, nine were contracted before the installation of the hypochlorite plant. Four of the remaining nine appeared in a group, from fourteen to thirty days after a report of bad water from the laboratory of the State Board of Health. Later, another bad

report was followed in from fourteen to twenty-five days after the taking of the sample, by a group of five water-borne cases. Dr. Kiefer stated that he believed the diversion to the river of all sewage now emptying into the bay, together with the installation of a permanent hypochlorite plant would insure good water. As for milk infection, he states, "I am satisfied this was not a milk outbreak!"

Figure 1* indicates the incidence of typhoid fever cases during five day intervals from Feb. 1, 1913, to June 1, 1914. This curve confirms what had already been observed in a general way: that the typhoid troubles begin very shortly after the ice forms over Thunder Bay.

Figure 2* shows the distribution of primary cases throughout the city which developed between Feb. 1 and May 30, 1913.

Figure 3* shows the same for the cases which developed between Nov. 11, 1913, and May 30, 1914.

All circumstances investigated seem to point to the water supply as the primary source of infection, contacts and scattered milk cases being possible. During the investigation made in April, 1913, it developed that there are a number of cows kept in Alpena within the city limits principally for the supplying of single families, the surplus milk being sold in small quantities to neighbors. This practice prevails among families of foreigners and others who probably are not well informed regarding sanitary regulations nor at all conversant with the mode of transmission of typhoid fever. It is quite possible, therefore, that the milk from such a household may be an easy vehicle for the transmission of disease in the instance of a cow being kept by a family having one or more cases of typhoid. Whenever a nurse was employed in families of this class, it was one of the so-called practical nurses, who probably knew little or no more than the ordinary member of the household concerning the technical methods of protection against typhoid.

Some consideration has been given by the city officials to the project of intercepting the flow from the sewers which now discharge into Thunder Bay between the waterworks and the mouth of Thunder Bay river and conducting the flow from them into the river, with the idea of removing the points of sewer discharge as far as possible from the waterworks intake. The Engineering Department has spent considerable time studying this question and has furnished the city with a report on the subject, but as yet no definite steps have been taken toward the construction of this improvement. On various occasions individual officials have been urged to use their influence toward the installation of a modern filtration system for the purification of Thunder Bay water, under the belief that its organic content and turbidity are too variable to render its sterilization by means of hypochlorite entirely reliable. It is to be regretted that nothing has yet been done to insure the construction of such a plant.

2 Capac. Nuisance Created in Belle River by Discharge of Paper Mill Waste.—The Capac Paper Company owns and operates a paper mill about two miles west of the village of Capac. The wastes from this mill reach the Belle River through a county ditch.

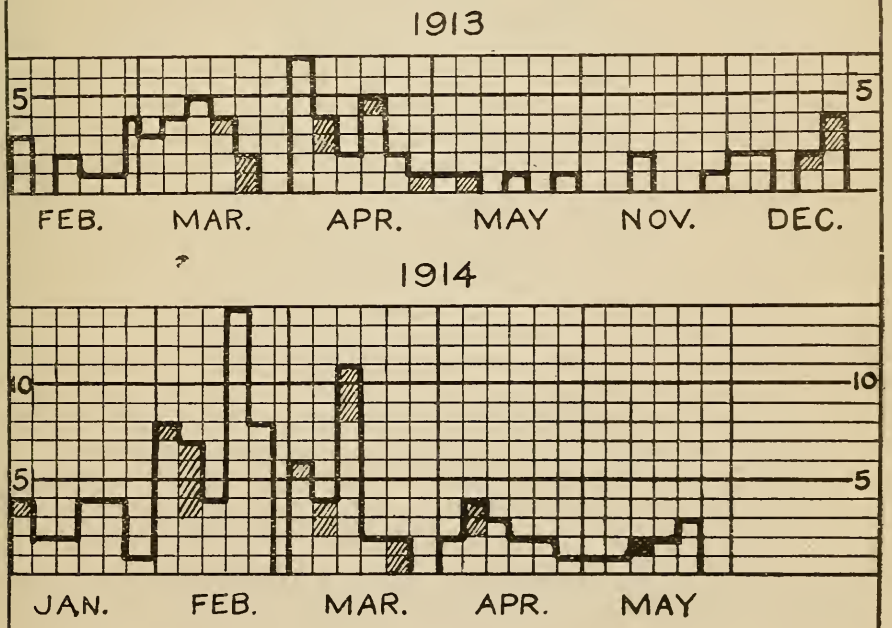
During the summer of 1913 complaints were sent to the State Board of Health contending that these wastes were the cause of the death of fish and a general nuisance in Belle River.

*See pages 39, 40, 41.

FIGURE 1.

CURVE SHOWING THE INCIDENCE OF TYPHOID FEVER CASES AT ALPENA, MICHIGAN. DURING 5 DAY INTERVALS FROM FEBRUARY 1, 1913 TO JUNE 30, 1914.

Contact and Imported Cases Shaded.



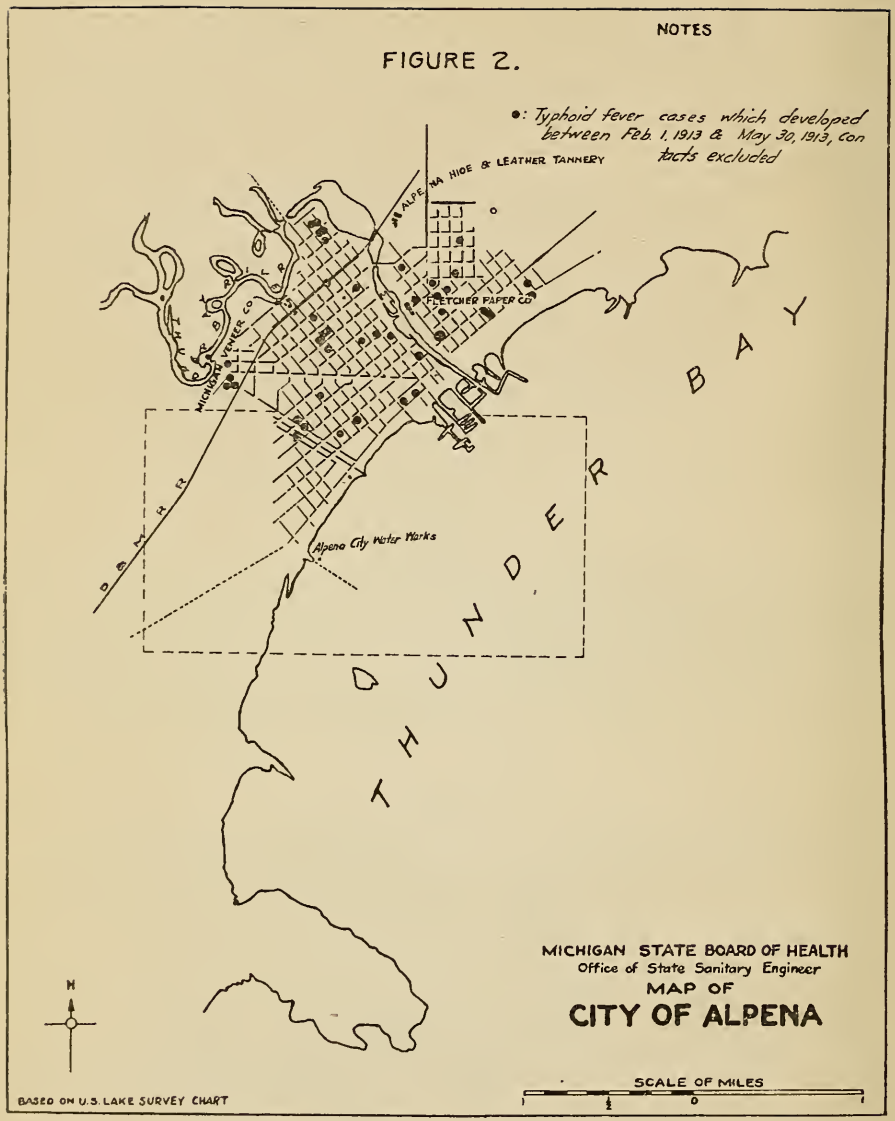
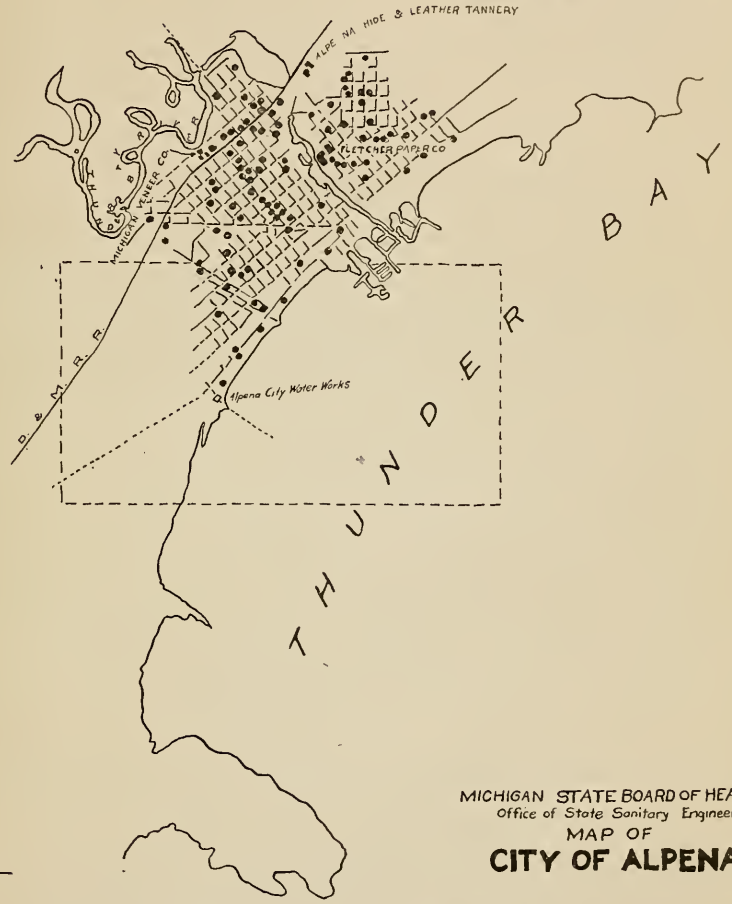

NOTES
FIGURE 2.
●: Typhoid fever cases which developed between Feb. 1, 1913 & May 30, 1913, contacts excluded
ALPENA HIDE & LEATHER TANNERY
FLETCHER PAPER CO.
MICHIGAN POWER CO.
Alpena City Water Works
THUNDER BAY
MICHIGAN STATE BOARD OF HEALTH
Office of State Sanitary Engineer
MAP OF
CITY OF ALPENA
SCALE OF MILES
BASED ON U.S. LAKE SURVEY CHART

FIGURE 3.

•: Typhoid fever cases, contacts excluded, which developed between Nov. 11, 1913 & May 30, 1914.



MICHIGAN STATE BOARD OF HEALTH
Office of State Sanitary Engineer
MAP OF
CITY OF ALPENA

N

SCALE OF MILES
1 ½ 0 1

BASED ON U.S. LAKE SURVEY CHART

The discharges from the plant consist of two distinct classes: peat waste and mill waste. Peat is used extensively in the manufacture of paper at this mill and in the process of washing it, large quantities of swamp muck are extracted. Most of this settles readily and for this purpose the flow is retained for 18 or 20 hours in a sedimentation basin, after which the water is used over again. The other outlet carries considerable pulp and lime, together with small quantities of oil from the engines. This passes directly to the d tch connecting with the Belle River. The condition of both the ditch and the river indicates that considerable peat water had escaped sedimentation and was allowed to flow into the ditch, causing an unsightly deposit of fine black silt for several miles down stream. This flow undoubtedly contained considerable organic matter in solution which was probably the cause of the death of fish. It was also said to have had an unwholesome effect upon cattle drinking the water from the stream.

The nuisance was abated by treating the wastes more carefully in the sedimentation basin.

3. Dearborn Water Supply.—Mr. Henry Ford is constructing a very complete and modern rapid sand filter plant primarily for furnishing his estate at Dearborn with pure water, but also for supplying filtered water to the village of Dearborn. The village will construct the distribution works and Mr. Ford will furnish the water. At the request of Mr. Ford's representative, inspections of the possible sources of contamination along the south branch of the River Rouge have been made.

The village of Dearborn is to be congratulated upon being able to obtain such a valuable equipment under such favorable circumstances.

4. Eaton Rapids Typhoid Epidemic.—During September, 1913, eighteen cases of typhoid fever developed at Eaton Rapids. This may not seem an unusually large number, but it is of no small moment in a town of 2,500 inhabitants. A detailed investigation of the cases and circumstances surrounding them, made by Henry F. Vaughan, Acting Medical Inspector, did not result in definitely locating the source of contagion. The only feature which seemed to be common to all, or nearly all, of the cases was milk furnished by one man, though the water supply used by some of the cases was not above suspicion. A careful investigation of all the circumstances which might have affected the milk supply in question was made. It was found that this milk man produced part of the milk which he sold and bought the rest from another farm. The sanitary surroundings of the farm in question were not of the best. The milk house was not screened against the entrance of flies, the utensils were generally washed in water from a cistern near the house. Deep well water is available but not often used. The bottles were first washed and then sterilized with steam.

Analyses of samples taken from the well and cistern at the farm show the presence of B. Coli. in both.

An open privy was within 50 or 100 feet of the milk house.

No history of typhoid fever in the family or at the farm could be obtained. Instructions were issued to the dairymen that all the water used in washing utensils be sterilized with hypochlorite of lime in the proportion of 10 parts available chlorine to one million parts of water.

While most of the facts ascertained during the investigation seemed to point toward the milk supply as the cause of this epidemic, it seems that these facts are hardly conclusive enough to warrant the statement that the milk was actually the cause, inasmuch as so many private wells of doubtful or distinctly bad quality were in use in the city, as well as numerous privies.

Eaton Rapids has not shown a very clear record with reference to typhoid fever as will be seen from the following table:

Date.	Deaths from typhoid fever.	Death rate per 100,000 population.
1906	1	45.5
1907	0	0.
1908	3	136.1
1909	0	0.
1910	1	45.5
1911	5	227.5
1912	1	45.5

Average for 7 years, 56.0.

Advice was given to the city authorities to extend the use of the water supply which seems to be safe, and to abolish privies and the use of private wells as fast as possible.

5. Escanaba Water Supply.—Since the installation of the water filtration plant at Escanaba in the fall of 1909, a very marked decline in the typhoid curve has been evident, as will be seen by reference to the diagram on page 136 of the 1913 report. During 1913, however, a slight rise in this curve, together with a change in the management of the waterworks company, caused some apprehension that the filtration plant was not accomplishing all that it was capable of. Accordingly, a consultation and careful inspection was made during June, 1914, with the officials of the water company and their engineer. Various recommendations were made to the company for improving the plant so as to make its operation more convenient and its efficiency more reliable. This included a thorough cleaning and repair of the strainer system, the removal of some of the gravel and the substitution therefor of proper sand, increase in velocity of wash water, installation of loss of head indicators, calibration of rate controllers, installation of hypochlorite treatment of the effluent and additional conveniences in the laboratory for more complete bacterial analysis. The company has shown entire willingness to comply with these requests and arrangements have been made for doing so.

6. French Landing. Nuisance Created in the Huron River by the Wastes from the Garbage Reduction Works.—The Detroit Reduction Company operates a plant on the Huron River at French Landing for the recovery of grease from garbage. During August, 1913, complaints were received from the Fish and Game Warden's Department against the killing of fish in the Huron River, attributing the same to the waste produced from the Detroit Reduction Company's works.

An inspection was made of the surroundings of this plant on Aug. 11, 1913. The secretary of the reduction company had recently taken charge of the plant and extensive improvements were under way, which, when completed, will discontinue the use of the stream for the disposal of garbage reduction wastes.

The plant is not at all complete in the scope of its operations. The recovery of as much grease as is easily obtainable is about all that was being accomplished. The liquid pressed out of the cooked garbage is all that is used for grease production; floor washings and other liquids are held for a short time in a small tank to allow the grease to rise to the surface and are then discharged into the stream. The juices from a considerable quantity

of green garbage were also leaching into the river. During a large part of the year no objectionable conditions obtained in the river because the flow was of a quantity sufficient to dispose of all of the discharges by dilution, but at seasons of low water, nuisances were complained of.

The company has agreed to hasten its improvements so that the difficulties will not be repeated.

7. Pollution of Grand Rapids Water Supply by Tannery Wastes.—During May, 1913, the attention of the Board was called to the discharge into the Grand River of tannery waste from the works of the Wallin Leather Company, situated two or three miles outside the city limits of Grand Rapids at a place called Mill Creek. The discharge takes place at three outlets from the tannery and consists of the trade wastes of the plant, with which is probably mixed a small quantity of flow from toilets.

Tannery waste is, of course, charged with a high amount of organic matter such as hair and fleshings, as well as the spent tan liquors and some other chemicals, such as lime and sulphuric acid.

In this particular case it is doubtful if this pollution of the river has any serious effect upon the purity of the Grand Rapids supply, inasmuch as the flow in the stream is very large indeed compared with the quantity discharged from the tannery but there is a strong sentimental objection on the part of the citizens and health authorities of Grand Rapids against this foul liquid being mixed with the water used for the domestic supply of the city.

During the fall of 1913 laboratory experiments were conducted to determine, if possible, whether or not chemical precipitation was advisable for the clarification of these wastes. It was found that satisfactory results could be expected but that the cost would probably be out of proportion to the results obtained. Shortly after this some experiments were made at the tannery to ascertain the effect of sedimentation upon the wastes but were not conducted for a sufficient length of time to arrive at any definite conclusions. It is expected to carry these experiments considerably farther as soon as an opportunity is afforded.

8. Grandville. Water Supply.—Not until after the contract had been awarded and construction of the distribution system completed, was the Board informed of the nature of the source of Grandville's water supply. It is proposed to take water from shallow driven wells, in the heart of the village. These wells comprise two six-inch, and one two-inch, 30 feet deep and passing through fine and coarse gravel. The wells are at present surrounded by serious contamination and the village authorities were informed that these sources must be removed. They were also given to understand that these wells were a dangerous source of supply and that more than ordinary precautionary measures must be enforced, if these wells are to yield a suitable drinking supply.

9. Greenfield Township. Private Water Supplies.—During December, 1913, an inspection was made of that section of Greenfield township just outside the city limits of Detroit on Grand River Avenue, for the purpose of investigating the safety of the private well supplies used by the citizens of that community. Being outside the city, there are no public water supply mains nor sewers and shallow private wells must be relied upon. The geological formation near the surface is of sand, and water is obtained at a depth of 10 to 20 feet.

Most of the houses have outdoor closets but a few have installed plumbing

and are using septic tanks or cesspools. There is little or no disposition on the part of the citizens of this portion of Wayne County to do much in the way of permanent construction because they feel that it will not be long before the territory will be included within the city limits of Detroit.

Samples were collected from about 14 wells, most of which were found to be unsafe upon examination. The health officer and the citizens were informed of the findings and warned against the use of shallow well water. A deeper well has been driven for the use of one of the schools and as this has proved satisfactory, it is hoped that the sinking of more deep wells may be expected from time to time.

10. Harbor Beach. Sewerage.—A deplorable nuisance exists in the midst of this little city. Two small streams or runs, which cut through the main section of the town, are receiving the "combined" sewage from the entire community. The citizens of Harbor Beach are beginning to realize the necessity of an adequate sewerage system with disposal works and the authorities are putting forth every effort to bring this question before the people for their approval. R. W. Roberts of Saginaw has been engaged to prepare plans and estimates for a complete sanitary sewerage system, with sewage treatment in view. It is the intention to submit a bonding proposition to the voters as soon as possible.

11. Howell Sewerage and Sewage Disposal.—The city of Howell has a separate system of sewers discharging directly into the Shiawassee River, which at that point is a very small stream, about 6 or 8 feet wide and perhaps 6 inches deep. Several complaints have been lodged with the State Board of Health relative to the pollution of this stream. These have come from riparian proprietors below. In response to these remonstrances the State Sanitary Engineer visited Howell during March, 1914, in company with a representative of the engineering firm which designed the sewer system. The disposal of sewage by dilution, in this case, is at best only a temporary expedient and during the dry season the flow in the stream is entirely inadequate to care for the large quantities of milk wastes which reach the sewers of Howell from the condensary of the Borden Condensed Milk Company. The officials of Howell and their engineers have been informed of this fact and we hope that they will proceed soon with the design and construction of treatment works.

12. Huntington, Indiana, Garbage Incinerator.—In connection with the agitation in Lansing for improved garbage disposal, the State Sanitary Engineer and the City Engineer of Lansing visited Huntington, Indiana, during May, 1914, and inspected the incinerator there in use. This type of incinerator is particularly well adapted to the use of small municipalities. It consists of two arched cells of brick and lined with fire brick. Each combustion chamber is 4 to 6 feet high in the center and about 12 feet square. It has a flat bottom, to one side of which is the fire box about 4 feet long and 12 to 15 inches wide with grate and ash pit. A flue leads from the opposite side of the cell into the stack; near this is a small door for the removal of ashes and rubbish produced by the incineration of garbage. The arrangement is such that the hot gases pass entirely around the chamber on their way from the fire box to the stack and the heat reflected from the side and top walls maintains high temperatures in the cells. Garbage is dumped through a charging hole about two feet in diameter at the top in a heap in the middle of the chamber floor and is consumed from the outside of the pile inward, as fast as the material dries. Very little stirring of the burning garbage is

necessary until combustion has proceeded to a considerable extent. The plant is equipped with a floor a little above the level of the top of the cells where the collection wagons discharge their load directly into the incinerating chamber.

The garbage being received on the day of inspection was ordinary kitchen waste containing perhaps 10 per cent of combustible rubbish, largely paper, some bits of wood and various discarded household articles, none of which contained much fuel value. Tin cans and bottles were allowed to go into the furnace with the garbage. The following temperatures were observed during inspection:

Temperature in the charging hole before charging.....	1150°F.
After stirring the fire.....	1300°
After stirring the fire and just before charging.....	1150°

The cell was then charged with garbage of the character above mentioned and several barrels of spoiled fruit, about two loads in all. This lowered the temperature in the cell to 700° for about 5 minutes after which it rose to 1000° and so remained for about an hour. At this time the temperature of the gases passing to the stack was 1300°.

No information was available by which the quantity of coal required could be determined except the statement on the part of those in charge that one pound of coal is sufficient for 10 or more pounds of garbage.

No odors of burning could be detected in the vicinity of the incinerator, though carelessness in dumping the loads scattered some of the material upon the heated floor which gave rise to slight odors of cooking at that point. This could easily be eliminated by better operation.

The collection wagons were equipped with false bottoms so perforated that the water, draining from the garbage during the passage of the vehicle over rough roads, settles into the lower compartment, which is about 4 inches deep, from which it is drawn off into the sewer before the load is dumped.

13. Ice Inspections.—In February, 1914, the Detroit City Board of Health requested assistance in the handling of their ice problem. Accordingly, one of the Acting Medical Inspectors of the Engineering Division was detailed on this work. Twenty-nine ice fields in and around the City of Detroit were visited, samples collected and analyses made at the laboratory of the Detroit Board of Health. Instructions were given for the better handling of the ice on the field and in the ice houses during packing.

The sanitary surroundings of most of the places visited were found to be very good. The larger companies pay more attention to such essentials than do the smaller dealers.

Ice inspection is more important from an aesthetic than from a sanitary standpoint. Analysis of ice taken from polluted water always shows better than an analysis of the water itself. Repeated tests on ice in storage shows an improvement in quality corresponding somewhat to its length of storage. However, ice inspection should not be abandoned, but should be carried on systematically, in order to insure the best quality possible, and safeguard the people using ice in direct contact with food and drink.

14. Lapeer. Michigan Home and Training School.—The attention of this Division has recently been called to the condition of the sewage treatment plant at this institution. The works consist of shallow septic tanks and cinder filters. It was designed in 1907 and its subsequent operation clearly indicates that the principles of sewage disposal were then in the early stages of development. The plant is entirely inadequate to care for the large flow

of sewage from this institution and the present installation must be remodeled or a complete new one built to take its place. Until a thorough study of existing conditions has been made, it will be impossible to say which plan will be the better to pursue. The Department intends to take up this investigation at once and prepare plans for an adequate sewage treatment plant.

15. Lawndale Creamery Nuisance.—Lawndale is the name of a station on the Pere Marquette Railroad a few miles west of Saginaw in Saginaw County. Close to the railroad tracks and depot is located a milk skimming station. The wastes from this station consist of the washings of utensils and cans and such milk as may escape from the various containers.

In response to a complaint of an alleged nuisance an inspection was made during September, 1913, and it was found that three wooden tubs had been sunk in the ground in line with the outlet sewer from the building to act as settling basins for the suspended matter in the sewage. It was hoped that these would prove efficient, but in June, 1914, an objection was raised and a second inspection revealed a very unsightly and objectionable condition in the road-side ditch leading away from these settling tanks.

The Assistant Prosecuting Attorney, who had the matter in charge, was advised that under the circumstances the only certain method of waste disposal for this establishment would be to collect the sewage in a tank of convenient size, pump the same into wagons, haul it away and dispose of it on land.

16. Manistee Sewerage.—During December, 1913, the State Sanitary Engineer was called into consultation with the officials of the city of Manistee relative to a peculiar condition existing in one of the main outlet sewers. The sewer in question is of brick construction 3,900 feet in length, about 2-3 of it 4 feet in diameter and the remainder 4 1-2. Some 1,400 feet below the surface of the ground traversed by this sewer lies a considerable deposit of salt which is being removed. Since many of the strata overlying this salt deposit are of rock, it seems almost impossible that the voids created by the removal of salt should have any effect on the surface, but, nevertheless, large areas of ground occupied by buildings within the city limits have settled so much as to necessitate the readjustment of pavements, street car tracks, sidewalks, etc. These settlements in some cases have been as much as four or five feet. The sewer in question had been found to be about 4 feet lower in some places than it was when built, thus forming a pocket in which deposits readily accumulate. As the ground above this sewer is covered with railroad yards, pavements, shops, salt blocks and various other buildings, the expense of its rebuilding would have been prohibitive. It was therefore recommended that a new outlet be provided for the sewage of the eastern part of the city, to discharge into Manistee Lake instead of through the old sewer into the lake outlet as heretofore. The situation was canvassed quite thoroughly with the City Engineer and a report was made to him advising the proper size of sewer to be used and calling for rough screening and discharge into deep water.

17. Marlette. Sewerage.—The village of Marlette is sewered on the combined plan. The sewers now in use were originally laid for storm and surface water only, but at the present time there are numerous house connections made to them. There are three main outlets, all discharging into the Duff drain at the same point, a short distance from the center of the town. The condition of this drain, below these sewer outlets, is extremely

objectionable. The residents in this section of the village repeatedly called the attention of the village officials to the state of affairs existing in the Duff drain, but no action was ever taken. They claimed lack of funds, but the inaction was caused principally by inertia.

In May, 1914, the nuisance existing in this drain was called to the attention of this Division. An inspection was made on June 1st. Upon careful examination, it was found that if the flow from the above mentioned outlets were collected and carried in a sewer to a point approximately 1,100 feet below the present outlets, a septic tank could be built that would do away with the nuisance now existing. After talking the matter over with the village officials it was found that no action could be expected from them on their initiative. A resolution was therefore drawn up by the Department of the Attorney General, ordering the nuisance abated and it was adopted by the State Board of Health at their quarterly meeting in July, 1914.

18. Menominee Water Supply.—During June, 1914, an inspection was made of the plant of the Menominee Water Company and suggestions made for improving the hypochlorite dosing apparatus.

The sewer known as the Fish Court sewer empties into Green Bay about half a mile from the intake and it is believed that the general trend of the current in the bay is such as to tend to carry this sewage toward the intake. This sewer drains only a small portion of the town and can easily be eliminated by means of pumping. The necessity of this improvement was brought to the attention of the Mayor of Menominee. A letter has been sent to him by the Secretary informing him that it is the opinion of the State Board of Health that this improvement should be completed at an early date.

19. Mill Creek Typhoid Fever Investigation.—During the autumn of 1913, eleven cases of typhoid fever developed in the community of employees of the Wallin Leather Company at Mill Creek, Plainfield Township, about three miles north of the Grand Rapids city limits.

The results of inspection seemed to indicate that milk, probably infected by a typhoid carrier, was responsible for some of the cases and the remainder traceable to direct contact. Sanitary precautions at the dairy and the substitution of chemical closets for the dangerous privies seem to have stamped out the epidemic.

20. Petoskey. Sewage Disposal.—The city of Petoskey empties all of its sewage into Little Traverse Bay, the main outlet being at the mouth of Bear Creek, which is about 200 feet from the shallow well from which the city obtains its water supply. A large amount of suspended matter, brought into the Bay by the sewers, settles upon the bottom and is washed upon the beach from time to time by wave action, resulting in a nuisance along the shore.

Many of the city officials are of the opinion that the city water supply is also endangered, and it would appear that they have good reason for their suspicions. There has been considerable agitation for a deep-well supply, or for one further removed from contamination and considerable money has already been expended in these directions. Without doubt, a better supply will be developed in the near future. As a remedy for the existing nuisance along the shore, the Council has decided that a septic tank will practically eliminate the condition. The city engineer has been authorized to design and construct a suitable tank. The engineer has appealed to this Division for assistance and advice and all possible co-operation will be given to bring about the best possible solution of the entire question.

21. Munising Water Supply.—On account of the prevalence of typhoid fever in the city of Munising in the late summer and early autumn of 1913, an investigation of the epidemic was made on September 10th and 11th. The city of Munising is situated at the southern end of a small arm of Lake Superior, known as Munising Bay. This bay is quite a prominent pocket in the lake shore and has a comparatively narrow mouth. Just outside of this mouth is situated Grand Island. The geography of the bay and island resembles somewhat a huge bottle with the cork partly pulled out. The channels between the island and the mainland on either side of the bay are narrow and subject to currents which are said to reverse their direction according to the prevailing winds in Lake Superior. A westerly wind tends to bring lake water into the bay from the west and turn the eastern channel into an outlet. An easterly wind is said to completely reverse the flow. A small stream known as the Anne River, which takes most of the sewage of the city, enters the southern end of Munising Bay. From the above it will be readily seen that any contamination brought down by the river is much more liable to be dispersed through the shallow waters of the bay than to be carried out into the lake. It will also be noted that the contamination of the bay water at a given point would be expected to be highly variable from time to time, according to the direction of the wind.

Munising has been supplied with water from two sources: part of it comes from a spring on the hill back of the city and the remainder is taken from the bay through a comparatively short intake and from a depth of only about 4 feet. An inspection of the spring supply did not reveal any sources of contamination but samples taken showed the presence of bacillus coli, perhaps from the influence of animals pastured to some extent upon the water shed. The quantity furnished by this spring is insufficient for the needs of the whole community and so it is mixed with the bay water supply and delivered through the same pumps. Upon recommendation of the department, hypochlorite disinfection was installed and seems to have effectively stamped out the epidemic. A project is under way for abandoning the present intake location and constructing a new one so as to take water from Lake Superior outside the bay. If this is done and disinfection is continued, the city of Munising ought to be in possession of a safe water supply.

22. Pontiac. Trade Wastes Disposal, Harger & Allen Rendering Works.—The rendering plant of Harger & Allen is located in the northern part of Pontiac, about fifty feet inside of the corporation line in a very sparsely built up neighborhood. Slaughter house offal and dead animals are cooked, under about 45 lbs. steam pressure, for from ten to twelve hours. The grease is then drawn off and the residue in the tanks pressed and dried and made into commercial fertilizer. The water pressed from the tankage and that used in the washing of the pressing cloths, gives rise to objectionable conditions.

A small stream flows by this plant, and the wastes from the rendering plant, after being run through a small septic tank, were turned into this creek. As the stream is so small as to be almost dry in summer, a nuisance has been created along its course through the residence portion of the city.

An inspection was made at this plant on May 12, 1914. Evidently the septic tank in use was being over-worked and tank treatment alone was insufficient to produce a non-putrescible effluent suitable for discharge into so small a stream. At the time of the inspection, plans were not obtainable

showing the construction of the tank, and no definite recommendations can be made until these plans are received.

23. Pontiac Sewerage.—In response to a complaint from a number of riparian owners along the Clinton River below Pontiac, an inspection was made of the condition of the river and of the sewerage system of Pontiac during June, 1914. The entire sewage of the city of Pontiac is discharged into the Clinton River through a 24-inch pipe near the eastern city limits. A considerable quantity of floating solids is evident along the stream and these were discernible, upon careful examination, at a point nearly 2 miles below the sewer outlet. No tests were made to determine the actual condition of the stream, but it is probably a fact that the Clinton River is being taxed nearly to its utmost in disposal of sewage by dilution without nuisance. The city officials were informed that disposal by dilution is unsuitable in this case and advised to take such steps as were necessary to make possible an early construction of sewage disposal works.

24. Port Huron Water Supply.—As no particular mention was made in the last report regarding the epidemic of typhoid fever which prevailed at Port Huron during the winter and spring of 1912, a few references to it may be permissible. The city is supplied with water by direct pumping from a suction well in the St. Clair River under the dock just outside of the pumping station, which, at the time of the first inspection, was constructed of triple lap sheet piling only. From this well two intake pipes extend about 60 feet easterly to the deep water of the main channel of the St. Clair River. During the spring of 1912 the walls of sheet piling were replaced by a two-foot wall of concrete. On the upstream side of this suction well, one or more emergency gates were provided for use when the intake pipes become obstructed with anchor ice. Quite an extensive portion of the northeast part of the city is unsewered on account of the fact that it is too low to be tributary to the city sewer system. A small stream winds its way southeast through this section and of course receives considerable surface washings and privy seepage. One or two private sewers have been connected directly to this brook.

Numerous manufacturing establishments along the river front north of the waterworks pumping station have crude toilet facilities, allowing pollution to reach the water more or less directly. None of the city sewers empty into the river above the waterworks intake, but the Lincoln Ave. sewer, one of the main outlets, enters the river two or three hundred feet below the pump house. The bend of the river is such as to throw its main current, carrying water fresh from Lake Huron, well in toward the west shore at the pumping station and thus tending to form an eddy below the suction well, and it is supposed that contamination from this sewer might have been carried by the eddy to the well and passed through the joints in the sheet piling and thus reached the water supply. Undoubtedly the water flowing close to the shore past the city of Port Huron is seriously contaminated by the industrial establishments along its banks and from the small stream mentioned above, but as long as the supply comes through the intake pipes from deep water in the channel, a safe water is reasonably assured.

During the year 1913 the death rate per hundred thousand from typhoid fever reached the enormous figure of over 200 and evidently some serious disturbance must have taken place in the river which mingled sewage with the city water in considerable amounts. At the advice of the Engineering Division, a hypochlorite dosing apparatus was installed and has since been in operation. Its use seems to have established control over the situation

and the city has been comparatively free from typhoid, except for an epidemic of less proportions, which occurred early in the winter of 1914, due to the opening on one or two occasions of the emergency gates above mentioned. On these occasions it is undoubtedly true that more pollution was admitted to the water than could be sterilized by the amount of hypochlorite being used. The apparatus for dosing the water with a hypochlorite solution is automatic with the speed of the main pumps, and if proper care is used in preparing the solution and in regulating the strength thereof, reasonably satisfactory results should be assured.

The situation, however, will not be without danger until the sewerage of the low lying portions of the northeast part of the city is completed. This question has been under consideration at various times but nothing as yet has been decided upon.

25. Reed City Sewerage.—During January, 1914, the State Sanitary Engineer was called into consultation by the Village President of Reed City relative to the construction of a complete system of sewers. Plans for the same had been prepared some years previously by a Chicago firm. These were examined somewhat in detail and several changes, intended to reduce the cost and improve the service, recommended. Shortly afterwards, during the campaign for the construction of this sewer system, the two local newspapers were furnished with various articles on the subject by members of the engineering staff. The election was closely contested and the project defeated, owing largely, we believe, to local jealousies which crept into the controversy.

26. Saginaw Water Supply.—The city of Saginaw obtains its public water supply from the Saginaw River. The city is situated on both sides of the stream and separate pumping stations are maintained. The supply thus derived is grossly polluted and entirely unfit for drinking purposes. Drinking water is obtained from deep wells, from 80 to 125 feet deep, located on the street corners. This, of course, is unsatisfactory, from a sanitary standpoint, as these wells are always subject to sudden and serious contamination.

The Board of Water Commissioners of the city of Saginaw in 1906 retained George W. Fuller, Consulting Engineer of New York City, to report on the water situation in their city. Mr. Fuller recommended a consolidated pumping station and mechanical filtration, with the water taken from the Saginaw River above all sewer outlets. A proposition to bond the city for this much needed improvement was submitted to the voters April 2, 1906, and was defeated.

In 1909 the Board of Water Commissioners retained George C. Whipple, of the firm of Hazen & Whipple, New York City, to make a report and recommendations on their water supply. The findings of Mr. Whipple were in substantial conformity with those of Mr. Fuller in 1906. The people voted on waterworks improvement bonds in 1910 and again turned the proposition down.

On January 1, 1914, the city of Saginaw adopted the commission form of government. One of the first acts of the new Commission was the retaining of George W. Fuller, of New York City, to make recommendations toward the improvement of the water supply. Mr. Fuller again advised the installation of a mechanical filtration and water softening plant together with a consolidated pumping station located on the east side of the river, with duplicate force mains leading to the west side of the city. He advised that the pumping station and treatment plant be placed about half way between

the present East Side pumping station and the main business district of the city in order to be able to maintain better pressure and thus reduce insurance rates; the water to be taken from the Saginaw River near the present East Side pumping station and conducted by tunnel to the new plant. On April 27, 1914, the citizens of Saginaw voted a third time to bond the city for pure water but the issue lost. Numerous reasons are set forth for the failure to approve bonds for the improvement of the city water supply. Saginaw is a beautiful city but its residents are continually menaced by a contaminated water and the main body of the people do not seem to appreciate the gravity of the situation.

27. Saline Sewerage.—Some time shortly before the State Board of Health was given authority over sewer systems, the village of Saline constructed such a system under the design and supervision of a competent engineering firm. At the request of the village officials, the State Sanitary Engineer visited Saline during March, 1914, and gave them detailed instruction for the maintenance of their new sewer system, including cleaning, and the necessary regulations to insure proper house connections.

Unfortunately, the design of the sewer system relies upon disposal by dilution in the Saline River and the main outlet is so located as to render the installation of treatment works expensive. If treatment of this sewage becomes imperative it will be necessary to re-lay some of the outfall sewers in order to obtain fall enough for treatment works.

About the time the first connections were made a complaint was lodged with the State Board of Health against the use of the Saline River for sewage disposal by a firm of mill owners on the stream about 3 or 4 miles below the sewer outlet. An inspection was made of the stream between these points on June 5, 1914, by the State Sanitary Engineer, accompanied by some of the village officials. The Saline River seems particularly well adapted to take care of a moderate amount of crude sewage without nuisance and unless an unduly large quantity is turned into it, it is not believed that valid objections can be raised. The complainants were advised that it would be necessary for them to wait until a definite nuisance had been created before they could take action against the village of Saline.

28. Saranac Water Supply.—During January, 1914, the assistance of the engineering department was requested by the officials of the village of Saranac in educating the voters to the necessity of authorizing the construction of a waterworks system. Accordingly, the State Sanitary Engineer made an address on the subject before a meeting of the citizens urging the installation of a water supply and approving the plans prepared by the engineer in charge. This project was subsequently authorized.

29. Summer Resort Sanitation.—Table No. 16 shows 51 summer resorts inspected up to June 30, 1914. During the summers of 1911 and 1912 the present State Sanitary Engineer, as an Acting Medical Inspector, together with two other Medical Inspectors, visited 22 summer resorts for the purpose of making sanitary surveys. During 1913, 27 inspections of the same order were made by the State Sanitary Engineer and his assistant, acting in the capacity of a Medical Inspector. Up to June 30, 1914, three inspections were made by the members of the engineering force.

A perusal of the reports of the several inspections show two main faults at the majority of the places visited. These are:

1. Inadequate garbage and refuse disposal.
2. The almost universal use of the open vault privy.

In the resorts where there is an organization and a governing body, the first of the above mentioned deficiencies is not so apparent as in the smaller resorts where everyone is a law unto himself. In the places under a central control, garbage cans are provided and a regular collection of garbage and rubbish enforced. The people who spend their whole summer at the resorts give little trouble, but those who rent a cottage or put up a tent for a week or two often throw their garbage and refuse on the ground and then leave before conditions reach such a state that the authorities are called in. The only solution of this difficulty is the division of the summer resort section of the state into districts and the placing of a patrol over each one. These districts should be of such a size that the inspector in charge could cover the same in not over three weeks and as soon as one trip is completed, another started and the different places visited in no regular order and the constant offenders taken before the court, when found necessary, and prosecuted under the nuisance laws.

The open vault privy was found to be in almost universal use in both the large and small resorts, although some of the larger ones, particularly those on the Great Lakes, have complete waterworks and sewer systems. In the resorts which have a central controlling body, frequent cleaning of the vaults was found to be the rule. Lime was in use but generally in such small quantities that it did little or no good. Engineering Bulletin No. 3, dealing with the construction of a "Sanitary Dry Earth Closet," was distributed and its use advised. In some instances chemical closets have been installed.

Numerous water samples were collected and analyzed, and wells condemned, when found contaminated.

30. Traverse City. Sewerage and Sewage Disposal.—Traverse City is situated on the west arm of Grand Traverse Bay. The water supply is taken from the Bay through a 24-inch intake, which extends 1,700 feet from shore and into about 20 feet of water.

The city is sewered on the combined plan although a great many of the sewers are no more than large enough for sanitary purposes. Consequently, trouble is frequently experienced by the sewers becoming gorged, in time of storms, and flooding basements. Numerous sewer outlets are located along the Boardman River, which flows through the business portion of the city. The stream is badly polluted and objectionable conditions exist along its banks. The river empties into the west arm of Grand Traverse Bay, at a point about three-quarters of a mile east of the waterworks intake. While no very accurate records are obtainable in regard to the currents in the Bay, some float observations have been made and floats placed in the river mouth appeared in the vicinity of the intake in about nine days.

Traverse City has an abnormal typhoid death rate, although it has never reached what might be called an epidemic. The City Commission, recognizing the gravity of the situation, both as regards a more efficient sewer system and the protection of their public water supply, retained Geo. S. Pierson, Consulting Engineer, to prepare plans for a comprehensive separate sewerage system and treatment plant.

The design submitted by Mr. Pierson called for the building of an intercepting sewer along Boardman River, to collect the flow from the several outlets and carry the same to a site for a treatment plant, on the Bay shore near the mouth of the river. The treatment designed is to consist of septic tanks and contact filters. Plans of the proposed installation were submitted and approved by the Engineering Division of the State Board of Health and

a proposition to bond the city for the necessary funds to carry on this work was submitted to the voters June 24, 1914. We are sorry to announce the failure of the people to vote the required money.

31. Wyandotte Water Supply.—It has been well known for a number of years that the water supply situation at Wyandotte is extremely grave. As illustrative of this point, the following typhoid record is cited:

Year.	Death rate per 100,000.	Year.	Death rate per 100,000.	Year.	Death rate per 100,000.
1900	115.8	1904	73.7	1909	122.2
1901	95.3	1905	127.6	1910	96.5
1902	75.4	1906	72.1	1911	11.4
1903	93.2	1907	107.0	1912	54.1
		1908	123.5	1913	144.1

In response to a request for information from the City Clerk of Wyandotte, the State Sanitary Engineer called upon him during January, 1914, and held a conference with the Mayor, the other members of the City Commission and the Superintendent of Waterworks. The typhoid situation was explained to them and the construction of a modern filtration plant urged. Consumers did not seem to look upon the situation with as much seriousness as a non-resident would and it is doubtful if they realize the gravity of the conditions. These people seem to have lived so long in the midst of insanitary conditions as to be almost insensible to their existence. However, they did act upon the suggestion that hypochlorite treatment of the raw water from the Detroit River be immediately installed as a temporary expedient.

32. Zeeland. Water Supply.—The city of Zeeland obtains its water supply from a shallow well, 18 feet in diameter, located beneath the roadway, in the center of the business section.

In October, 1912, a representative of the State Board of Health inspected the well and its surroundings and advised the installation of a temporary hypochlorite apparatus and recommended that a systematic search be made to locate, if possible, a better well supply. Numerous test wells were put down and after expending a considerable sum of money, an abundant supply of pure water was found about one mile west of the present location and at a depth of 125 feet. As it will take some time to develop this new supply, it was deemed advisable to treat the present supply with hypochlorite. The apparatus was installed and put into operation in August, 1913.

33. Zeeland Sewerage.—Zeeland is also planning to install a comprehensive sanitary sewer system. Rumsey & Works of Grand Rapids are the engineers employed. Treatment by septic tanks and sand filters is contemplated and the effluent discharged into a small county drain. We are informed that immediate steps will be taken and construction will be under way this summer.

Zeeland heretofore has existed without adequate sewerage facilities and they are showing substantial progress toward bettering their general sanitary condition.

Respectfully submitted,
EDWARD D. RICH,
State Sanitary Engineer.

TABLE NO. 1.—*Municipalities whose question sheets on public water supply have been accepted to June 30, 1914.*

Addison*
Adrian
Ahmeek*
Akron
Albion
Allegan
Alpena
Applegate*
Armada
Ashley*
Athens
Au Gres*
Augusta*
Au Sable*
Baldwin*
Bancroft*†
Baroda*
Barryton*
Battle Creek
Bay City
Bear Lake
Beaverton
Belding
Bellaire
Belleville†
Bellevue*
Benton Harbor
Berrien Springs
Bessemer
Big Rapids
Birmingham
Blissfield
Boardman*
Boyne City
Breedsville*
Brighton*
Britton*
Bronson*
Brown City
Buckley
Caledonia*
Camden*
Carleton*
Carson City
Carsonville
Caseville*
Casnovia*
Central Lake
Centreville
Charlotte
Clare
Clarkston
Clayton*
Clifford*
Climax*
Clinton*
Coldwater
Colon
Columbiaville
Concord*
Constantine
Coopersville
Copemish*
Croswell
Crystal Falls
Custer
Daggett*
Dansville*
Davison*
Decatur
Deckerville
Dexter
Douglas
Dryden
East Jordan
East Tawas
Eaton Rapids
Edwardsburg
Elberta
Elkton
Elsie
Emmett
Empire
Escanaba
Essexville
Evart
Fairgrove*
Farmington
Fenton
Fife Lake*
Flint
Ford
Forestville*
Fountain*
Fowler**
Fowlerville
Frankenmuth*
Frankfort
Freeport***
Fremont
Gagetown
Galesburg
Galien*
Garden*
Gladstone
Gobleville*
Grand Haven
Grand Ledge
Grand Rapids
Grant
Grayling
Greenville
Grosse Pte. Shores
Hamtramck
Harbor Beach
Harrisville*
Hartford
Hastings
Hersey*
Highland Park
Hillsdale
Holland
Holly
Homer
Houghton
Howell
Howard City
Hubbell
Imlay City
Ionia
Iron Mountain
Ishpeming
Ithaca
Kalamazoo
Kalkaska
Kent City
Kinde
Kingsley
Kingston
Laingsburg**
Lake Odessa
Lakeview*
L'Anse
Lansing
Laurium
Lawrence
Lawton
Leonard*
Leroy*
Leslie
Lincoln*
Litchfield*
Lowell
Ludington
Luther*
Lyons
Mackinac Island
Mancelona
Manistee
Manistique
Manton
Maple Rapids
Marine City
Marion*
Marlborough*
Marlette
Marquette
Marshall
Mason
Maybee*
Mayville
McBain*
McBride*
Mecosta*
Melvin*
Mendon*
Menominee
Mesick*
Metamora*
Middleville*
Mikado*
Milan
Milford
Millington
Minden City
Montague
Montrose*
Morenci
Morley
Morrice
Mt. Morris
Mulliken
Muir
Muskegon
Muskegon Hts.
Nashville
New Baltimore
Newberry
New Buffalo*
New Haven
North Adams*
North Branch*
N. Muskegon
Northport*
Northville
Norway
Oakley*
Oakwood
Olivet
Omer*
Onaway
Onekama*
Onsted*
Ontonagon
Orion*
Ortonville*
Oscoda
Otisville*
Otter Lake*
Ovid
Owendale*
Owosso
Oxford
Parma*
Paw Paw
Perrinton*
Petoskey
Pawamo*
Pierson*
Pigeon
Plainwell
Pontiac
Port Austin
Port Hope*
Portland
Port Sanilac*
Posen*
Potterville*
Reading
Redford
Reed City
Reese*
Richmond
River Rouge
Rochester
Rogers*
Romeo
Roscommon
Saginaw
Sand Lake*
Sandusky
Saranac†
Saugatuck
Schoolcraft*
Sebewaing*†
Shelby
Shepherd
Sherman*
Sherwood*
South Haven
South Lyon*
Sparta
Spring Lake
Springport*
Stambaugh
Standish***
Stanton
Stanwood*
St. Clair
St. Charles
Stevensville*
St. Ignace
St. Johns
St. Joseph
Sunfield*
Stephenson*
Tawas City*
Tecumseh
Tekonsha*
Three Rivers
Towar*
Traverse City
Tustin*
Ubly
Union City
Utica*
Vernon*
Vicksburg
Wakefield
Waldron
Walkerville*
Watervliet
Wayland
West Branch
Westphalia*
White Pigeon*
Whittemore
Wyandotte
Ypsilanti
Zeeland

*No system
**Not used for domestic purposes.
***Fire protection only.
†System contemplated.

Total, 301
No system, 104

TABLE NO. 2.—*Municipalities whose plans on public water supply have been accepted to June 30, 1914.*

Athens	Eaton Rapids	Kingston	River Rouge
Bad Axe	Farmington	Lake Odessa	Rockford
Battle Creek	Flint	L'Anse	Romeo
Bay City	Fowlerville	Ludington	Saginaw
Beaverton	Flushing	Mancelona	South Haven
Belding	Fremont	Manistee	Sparta
Bellaire	Gladstone	Manton	Spring Lake
Benton Harbor	Grand Rapids	Marcellus	Stanton
Berrien Springs	Greenville	Marine City	Traverse City
Boyne City	Harbor Beach	Marlette	Ubly
Bronson	Highland Park	Marshall	Union City
Carsonville	Hillsdale	Mason	Vassar
Cassopolis	Holland	Muskegon	Vicksburg
Charlotte	Houghton	Muskegon Heights	Wakefield
Cheboygan	Howard City	Nashville	Watervliet
Clare	Hubbell	New Baltimore	Wyandotte
Coldwater	Imlay City	Olivet	Ypsilanti
Columbiaville	Ionia	Ovid	Zeeland
Constantine	Iron Mountain	Portland	
Coopersville	Kalamazoo	Reed City	Total, 80
East Jordan	Kingsley		

TABLE NO. 3.—*Municipalities whose maps on public water supply have been received, not all of which have been accepted to June 30, 1914.*

Bad Axe	Flint	Lansing	Pontiac
Bangor	Ford	Lapeer	Pt. Austin
Bancroft	Fowlerville	Laurium	Port Huron
Baraga	Frankfort	Lawrence	Portland
Battle Creek	Fremont	Lawton	Reed City
Bay City	Galesburg	Leonard	Richmond
Beaverton	Gaylord	Mancelona	River Rouge
Belding	Gladstone	Manistee	Rochester
Bellaire	Gladwin	Manistique	Rockford
Benton Harbor	Grand Haven	Manton	Romeo
Berrien Springs	Grand Ledge	Marcellus	Roscommon
Bessemer	Grand Rapids	Marine City	Royal Oak
Big Rapids	Grandville	Marlette	Saginaw
Birmingham	Greenville	Marquette	Saline
Boyne City	Harbor Beach	Marshall	Sandusky
Bronson	Harbor Springs	Mason	Saranac
Brown City	Hart	Midland	Scottville
Buckley	Hartford	Milan	Shepherd
Carsonville	Hastings	Millington	Sparta
Cassopolis	Highland Park	Monroe	Spring Lake
Cedar Springs	Hillsdale	Montague	Standish
Charlotte	Holland	Morenci	Stanton
Cheboygan	Holly	Mt. Pleasant	St. Ignace
Clare	Homer	Muskegon	St. Johns
Coldwater	Houghton	Muskegon Hts.	St. Joseph
Coloma	Howard City	Nashville	Tecumseh
Columbiaville	Howell	Negaunee	Three Rivers
Constantine	Imlay City	Newaygo	Traverse City
Coopersville	Ionia	New Baltimore	Ubly
Crystal Falls	Iron Mountain	Newberry	Union City
Decatur	Iron River	Norway	Utica
Dowagiac	Ironwood	Oakwood	Vassar
East Grand Rapids	Ithaca	Olivet	Vicksburg
East Jordan	Jonesville	Ontonagon	Wakefield
Eaton Rapids	Kalamazoo	Otsego	Watervliet
Elkton	Kinde	Ovid	Wayne
Empire	Kingsley	Owosso	West Branch
Escanaba	Kingston	Paw Paw	Wyandotte
Essexville	Laingsburg	Pentwater	Ypsilanti
Evart	Lake Odessa	Petoskey	Zeeland
Farmington	Lake View	Pinconning	
Fennville	L'Anse	Plainwell	Total, 167
Fenton			

TABLE NO. 4.—*Municipalities from which no reply was received on public water supply to June 30, 1914.*

Byron	Gaines	Linden	Twining
Capac	Grass Lake	Pellston	Vanderbilt
Clio	Grosse Pointe	Richland	Warren
Eagle	Harrietta	Rose City	Woodland
East Lake	Hesperia	St. Louis	
Ecorse	Lexington	Trenton	Total, 22

TABLE NO. 5.—*Municipalities using hypochlorite method for sterilizing their public water supply to June 30, 1914.*

Alpena	Grand Rapids	Munising	Traverse City
Ann Arbor	Ludington	Port Huron	Wyandotte
Battle Creek (Liquid Chlorine)	Marine City	South Haven	Zeeland
Detroit	Marquette	St. Clair	
Gladstone	Menominee	St. Joseph	Total, 18

TABLE NO. 6.—*Municipalities using rapid sand filtration system for purifying their public water supply to June 30, 1914.*

Adrian	Grand Rapids	Ironwood	Total, 5
Escanaba	Flint		

TABLE NO. 7.—*Municipalities whose question sheets on sewerage and sewage disposal have been accepted to June 30, 1914.*

Addison**
Adrian
Ahmeek
Alpena
Ann Arbor
Ashley*
Athens*
Augusta*
Baldwin*
Bancroft**
Baraga
Baroda
Barryton*
Bay City
Bear Lake
Beaverton
Belding
Bellaire*
Belleville
Bellevue
Benton Harbor
Benzonia*
Berrien Springs*
Bessemer
Blissfield*
Boardman*
Boyne City
Boyne Falls*
Breckenridge*
Breedsville*
Britton*
Bronson**
Brown City
Buckley*
Byron**
Cadillac
Caledonia*
Camden*
Caro
Carson City
Carsonville
Caseville*
Cassopolis
Central Lake*
Centerville*
Charlotte
Chesaning
Clayton*
Clifford**
Climax*
Clio*
Coldwater
Coloma*
Colon*
Columbiaville*
Concord*
Constantine
Coopersville
Copemish*
Croswell
Crystal Falls
Custer
Daggett*
Dansville*
Davison
Decatur*
Detour*
Detroit
Dexter*
Douglas*
Dryden*
East Jordan
Eaton Rapids
Edmore*
Edwardsburg*
Elberta*
Elkton*
Elsie*
Empire*
Escanaba
Evart
Farwell
Fenton*
Fife Lake*
Flint
Flushing†
Ford
Forestville*
Fountain*
Fowler*
Fowlerville**
Frankenmuth
Freeport*
Fremont
Fruitport†
Gagetown*
Gaines
Galesburg*
Galien*
Garden*
Gaylord*
Gladstone
Gobleville*
Grand Haven
Grand Ledge
Grand Rapids
Grant*
Grass Lake†
Greenville
Grosse Pte. Shores†
Harrison*
Harrisville**
Hartford*
Hersey*
Hillman
Hillsdale
Holland
Holly
Houghton
Howard City
Howell
Hubbell
Imlay City*
Ionia
Ishpeming
Jonesville
Kalamazoo
Kalkaska*
Kent City*
Kingsley*
Kingston*
Laingsburg*
Lake Odessa*
Lakeview*
Lapeer
Laurium
Lawrence*
Lawton
Leroy*
Leslie
Lincoln*
Lowell
Ludington
Luther*
Lyons**
Mackinaw City*
Mancelona*
Manton*
Maple Rapids*
Marcellus*
Marion†
Marine City
Marlborough*
Marshall
McBain*
McBride*
Mecosta*
Mendon*
Menominee
Mesick*
Metamora*
Middleville*
Mikado*
Milford*
Millersburg**
Monroe
Montague*
Montgomery**
Montrose*
Morley*
Morrice*
Mulliken*
Muir
Nashville
New Baltimore**
Newberry
New Buffalo**
New Haven
North Branch
North Muskegon
Northport†
Norway
Oakley*
Olivet*
Onaway*
Onekama*
Onsted**
Ortonville*
Oscoda†
Otsego
Otter Lake
Ovid
Owosso
Parma**
Paw Paw
Pellston*
Pentwater
Perrinton*
Petoskey
Pewamo*
Pierson*
Pigeon**
Pinconning
Plainwell
Pontiac
Port Austin**
Port Hope**
Portland
Port Sanilac*
Posen
Potterville*
Reading
Redford*
Reed City
Reese*
Richland*
Richmond
Rochester
Rogers*
Roscommon
Sand Lake
Saranac*
Schoolcraft
Scottville
Sebewaing**
Sherwood*
South Haven
South Lyon**
Sparta
Spring Lake***
Springport*
Standish
Stanton
Stanwood*
St. Clair
St. Charles*
Stephenson*
Stevensville*
Sturgis
Sunfield*
Tecumseh
Tekonsha**
Tower*
Traverse City
Ubly**
Union City
Utica*
Vanderbilt*
Vernon*
Vicksburg
Waldron**
Walkerville**
Wayland*
West Branch
Westphalia*
White Cloud*
White Pigeon
Whittemore
Williamston
Woodland**
Wyandotte
Ypsilanti
Zeeland***

Total, 263

*No System, 117
**Storm sewers only, 25
***System contemplated, 2
†Private sewers, 7

TABLE NO. 8.—*Municipalities whose maps and plans for sewerage and sewage disposal have been accepted to June 30, 1914.*

Adrian	Coopersville	Houghton	North Branch
Ahmeek	Davison	Howard City	Portland
Battle Creek	Detroit	Howell	Rockford
Beaverton	East Jordan	Ionia	Sparta
Belding	Eaton Rapids	Iron Mountain	Sturgis
Carsonville	Farwell	Kalamazoo	Vicksburg
Charlotte	Fremont	Laurium	Ypsilanti
Cheboygan	Gladstone	Menominee	
Clare	Hillsdale	Monroe	Total, 37
Coldwater	Holland	Nashville	

TABLE NO. 9.—*Municipalities whose maps on sewerage and sewage disposal have been received, not all of which have been accepted to June 30, 1915.*

Adrian	Eaton Rapids	Ishpeming	Petoskey
Ahmeek	Escanaba	Ithaca	Pinconning
Algonac	Evart	Kalamazoo	Plainwell
Alma	Farmington	Lapeer	Pontiac
Ann Arbor	Farwell	Laurium	Portland
Battle Creek	Fenton	Ludington	Reed City
Bay City	Flint	Manistique	River Rouge
Beaverton	Frankfort	Manton	Rockford
Belding	Ford	Marion City	Roscommon
Benton Harbor	Fremont	Marlette	Saline
Big Rapids	Gladstone	Marshall	Sandusky
Boyne City	Gladwin	Menominee	Scottville
Cadillac	Grand Haven	Merrill	South Haven
Caro	Grand Ledge	Midland	Sparta
Carsonville	Grand Rapids	Milan	Standish
Charlevoix	Grandville	Monroe	Stanton
Charlotte	Greenville	Morenci	St. Joseph
Cheboygan	Hastings	Mt. Pleasant	Sturgis
Clare	Highland Park	Muskegon	Tecumseh
Coldwater	Hillsdale	Nashville	Traverse City
Constantine	Holland	New Baltimore	Union City
Coopersville	Holly	Newberry	Vassar
Croswell	Houghton	North Branch	Vicksburg
Corunna	Howard City	Otsego	West Branch
Crystal Falls	Howell	Ovid	Ypsilanti
Davison	Hubbell	Owosso	Zeeland
Detroit	Ionia	Paw Paw	
East Jordan	Iron Mountain	Pentwater	Total, 110

TABLE NO. 10.—*Municipalities from which no reply was received on sewerage and sewage disposal to June 30, 1914.*

Akron	Grosse Pte. Farms	Memphis	St. Louis
Almont	Hancock	Morenci	Tawas City
Armada	Hanover	Mt. Morris	Three Oaks
Buchanan	Harbor Springs	Niles	Trenton
Capac	Harrietta	Oakwood	Twining
Dearborn	Hesperia	Orion	Vermontville
Eagle	Iron River	Pinckney	Wakefield
East Lake	Leonard	Quincy	Warren
Eau Clare	Lexington	Rose City	Whitehall
Frankfort	Linden	Sheridan	
Fraser	Manchester	Stambaugh	Total, 44
Grosse Pointe	Mayville		

TABLE NO. 11.—*Municipalities having sewage disposal works in operation, so far as known at the present time.*

Cadillac	Durand	Jackson	Sturgis
Caro	Fremont	Petoskey	
Charlevoix	Ithaca	St. Johns	Total, 11
Coldwater			

TABLE NO. 12.—*Municipalities contemplating changes or new installations of sewage disposal works.*

Alma	Grand Rapids	North Branch	Zeeland
Cadillac	Harbor Beach	Three Oaks	
Coopersville	Howell	Traverse City	Total, 12
East Grand Rapids	Muskegon		

TABLE NO. 13.—*Plans and specifications for State buildings recommended for approval by the State Sanitary Engineer to June 30, 1914.*

July 15, 1913.—Newberry State Hospital, Cottage C and Cloister. (Approved with respect to ventilation.)
July 25, 1913.—Adrian, State Industrial Home for Girls. (Plans for addition to Hospital.)
July 25, 1913.—Lansing, Michigan State School for the Blind, Superintendent's Office.
Aug. 1, 1913.—Newberry State Hospital, Cottage C and Cloister. (Approved with respect to drainage.)
Aug. 1, 1913.—Howell, State Sanatorium, Superintendent's Cottage.
Aug. 1, 1913.—Ionia, State Hospital, Addition to Women's Building.
Aug. 1, 1913.—Ionia, State Hospital, Employees' Building.
Aug. 5, 1913.—Ypsilanti, State Normal School, Addition to Gymnasium.
Aug. 6, 1913.—Howell, State Sanatorium, Addition to Cow Barn.
Aug. 6, 1913.—Lapeer, Home for Feeble-minded and Epileptic, Cow Barn.
Sept. 2, 1913.—Adrian, State Industrial Home for Girls, Sewing Building.
Sept. 30, 1913.—Marquette, Northern State Normal School, Administration Building.

The following have not been recommended for approval, owing to insufficient detail.

Sept. 2, 1913.—Kalamazoo, State Hospital, Raising roof.
Sept. 2, 1913.—Kalamazoo, State Hospital, General Kitchen and Dining-room, F. D., proposed alteration.
Oct. 29, 1913.—Newberry State Hospital, Cottage "C," Baker Shop.
Oct. 29, 1913.—Ypsilanti, State Normal College, Gymnasium (Revised plans.)
Nov. 18, 1913.—Jackson, Michigan State Prison, Hog Pens (Disapproved.)
Dec. 2, 1913.—Michigan State Prison, Hog Pens (Approved with restrictions in regard to drainage.)
Dec. 27, 1913.—Lansing, Michigan Agricultural College, Veterinary Building.
Jan. 26, 1914.—Kalamazoo, State Hospital, New Third Floor over Hall 3, F. D.
Mar. 3, 1914.—Lansing, Michigan School for the Blind, Heating and Ventilating Boys' Dormitory.
April 21, 1914.—Ionia, State Hospital, Men's Building.
May 14, 1914.—Mt. Pleasant, Central State Normal School, Science Building.
June 4, 1914.—Lapeer, Michigan Home and Training School, Addition to Administration Building, Ice House.
June 4, 1914.—Ypsilanti, Michigan State Normal College, Auditorium.
June 4, 1914.—Kalamazoo, Western State Normal School, Science Building and Central Heating Station,
June 23, 1914.—Coldwater, Michigan State School, New Ward Building.

Total, 27.

TABLE NO. 14.—*Sanitary inspections and consultations to June 30, 1914.*

Location.	Date.	Subject.	Engineer.
Ann Arbor	Mar. 3,1914	Ice inspection	D. W. Bingham.
Auburn	May 30,1914	County drain nuisance	F. G. Legg.
Azalia	Aug. 9,1913	Cheese factory nuisance	E. D. Rich.
Bad Axe	June 24,1914	Creamery and sewage nuisance	F. G. Legg.
Bancroft	May 6,1914	Cheese factory nuisance, sewerage and water supply.	F. G. Legg.
Bangor	Mar. 10,1914	Sewage nuisance in Black River	F. G. Legg.
Battle Creek	Dec. 22,1913	Proposed city jail quarters in City Hall	E. D. Rich.
Bay City	Jan. 27,1914	Dead fish in intake canal	F. G. Legg.
Bay View	Aug. 14,1913	Sewerage system	E. D. Rich.
Bellaire (Fisherman's Paradise Resort)	May 5,1914	Sewage disposal	D. W. Bingham.
Belleville	Nov. 15,1913	Sewerage	H. F. Vaughan.
Bendon (Reynolds Farm)	May 7,1914	Sewage disposal	D. W. Bingham.
Benzonia (Academy)	May 6,1914	Sewage disposal	D. W. Bingham.
Beulah	Aug. 13,1913	Sewerage system	E. D. Rich.
Beulah (White's Hotel)	May 6,1914	Sewage disposal	D. W. Bingham.
Big Rapids	Dec. 5,1913	Sewerage	H. F. Vaughan.
Big Rapids	May 1,1914	Water supply	E. D. Rich.
Birch Run	July 23,1913	Cheese factory nuisance	E. D. Rich.
Birmingham	June 19,1914	Pollution of Wing Lake	F. G. Legg.
Bloomingdale	June 8,1914	Nuisance	D. W. Bingham.
Boyne City	Nov. 14,1913	Tannery waste	E. D. Rich.
Cadillac	Nov. 14,1913	Sewerage	E. D. Rich.
Capac (Paper Co.)	Aug. 7,1913	Sewerage	E. D. Rich.
Cheboygan	Nov. 28,1914	Local nuisance and general consultation with City officials	F. G. Legg.
Chelsea	Oct. 4,1913	Sewerage system	E. D. Rich.
Chesaning	July 24,1913	Sewerage nuisance	E. D. Rich.
Clio	July 28,1913	Water supply, school	E. D. Rich.
Coldwater	Nov. 3,1913	Creamery nuisance	H. F. Vaughan.
Coloma	June 16,1914	Local nuisance	F. G. Legg.
Comstock	Feb. 4,1914	School house sanitation	D. W. Bingham.
Constantine	May 6,1914	Stream nuisance	E. D. Rich.
Coopersville	May 1,1915	Sewage disposal	D. W. Bingham.
Coopersville	May 19,1914	Sewage disposal	F. G. Legg.
Coopersville	Mar. 30,1914	Sewage disposal	D. W. Bingham.
Dearborn	May 27,1914	Stream pollution	E. D. Rich.
Dearborn (St. Joseph's Retreat)	May 27,1914	Sewage disposal	E. D. Rich.
Dearborn	June 6,1914	Water supply	E. D. Rich.
Detroit	Dec. 5,1913	Water supply	E. D. Rich.
Detroit	Mar. 12,1914	Consultation, on tuberculosis board	E. D. Rich.
Detroit	Feb. 20 to Mar. 6,1914	Ice inspection	D. W. Bingham.
Dundee	May 4,1914	Sewerage and water	F. G. Legg.
East Grand Rapids	Sept. 26,1913	Resort sanitation	E. D. Rich.
Eaton Rapids	Oct. 13-14,'14	Typhoid epidemic	H. F. Vaughan.
Eloise (Wayne County House)	May 27,1914	Sewage disposal	E. D. Rich.
Eloise (Wayne County House)	June 6,1914	Sewage disposal	E. D. Rich.
Escanaba	June 16, 17, 18,1914	Water filtration plant	E. D. Rich.
Eureka	Jan. 10,1914	Cheese factory nuisance	F. G. Legg.
Fenton	May 5,1914	Sewerage and sewage disposal	F. G. Legg.
French Landing	Aug. 11,1913	Garbage reduction works	E. D. Rich.
Galien	June 9,1914	Sewage disposal	D. W. Bingham.
Gladstone	Sept. 12,1913	Water supply	E. D. Rich.
Grand Ledge	Nov. 7,1913	Sewerage	E. D. Rich.
Grand Ledge	May 29,1914	Sewerage	E. D. Rich.
Grand Rapids (Wallin Leather Co.)	July 13,1913	Sewerage	E. D. Rich.
Grand Rapids	Oct. 15-16,'13	Tannery waste disposition	H. F. Vaughan.
Grand Rapids	Oct. 31,1913	Typhoid epidemic	H. F. Vaughan.
Grand Rapids	Nov. 21,1913	Typhoid epidemic	H. F. Vaughan.
Grand Rapids	Dec. 9,1913	Inspection of Kent County Detention Home for Juveniles	E. D. Rich.
Grand Rapids	May 15,1914	Circus nuisance	E. D. Rich.
Grandville	May 26,1914	Water supply	F. G. Legg.

TABLE NO. 14.—*Continued.*

Location.	Date.	Subject.	Engineer.
Greenfield Twp. (Wayne County)...	Dec. 12, 1913	Water supply	E. D. Rich.
Greenfield Twp	Jan. 30, 1914	Septic tank installation	F. G. Legg.
Grosse Pte. Park	April 21, 1914	Sewerage and sewage disposal	E. D. Rich.
Harbor Beach	Mar. 25, 1914	Sewerage	E. D. Rich.
Harbor Beach	June 25, 1914	Sewage nuisance and general sanitary conference.	F. G. Legg.
Hastings	Nov. 1, 1913	Stockyard nuisance	H. F. Vaughan.
Hastings	June 15, 1914	Sewerage	F. G. Legg.
Hemlock	Nov. 6, 1913	Sewerage for school	H. F. Vaughan.
Hillsdale	Sept. 6, 1913	Drainage nuisance	E. D. Rich.
Hillsdale	Mar. 19, 1914	Sewerage	E. D. Rich.
Holland	Nov. 21, 1913	Water supply	E. D. Rich.
Honor	Mar. 17, 1914	School house ventilation	D. W. Bingham.
Highland Park	May 26, 1914	Drainage	E. D. Rich.
Howell	Mar. 11, 1914	Sewerage	E. D. Rich.
Huntington, Ind	May 28, 1914	Garbage incineration plant	E. D. Rich.
Ida	June 10, 1914	Stopped-up drain	D. W. Bingham.
Iron Mountain	Dec. 19, 1913	Garbage disposal and ice supply	E. D. Rich.
Jackson	Jan. 9, 1914	Sewerage, water and river	E. D. Rich.
Jackson	Feb. 27, 1914	Jails	E. D. Rich.
Jenison	Jan. 21, 1914	Well pollution	F. G. Legg.
Jones Lake	July 17, 1913	Rendering works	E. D. Rich.
Kalamazoo	Feb. 27, 1914	Inspection of jails	E. D. Rich.
Lakeland	Mar. 3, 1914	Ice inspection	D. W. Bingham.
Lansing	July 17, 1913	Sewage nuisance	E. D. Rich.
Lapeer	Jan. 10, 1914	Sewage nuisance	E. D. Rich.
Lapeer (Home for Feeble-minded)...	June 10, 1914	Sewage disposal	E. D. Rich.
Lawndale	June 25, 1914	Creamery nuisance	E. D. Rich.
Lawrence	May 6, 1914	Sewerage and sewage disposal	E. D. Rich.
Ludington	Feb. 10, 1914	Water supply	E. D. Rich.
Manistee	Dec. 16, 17, '13	Sewerage	E. D. Rich.
Marine City	June 19, 1914	General sanitary conference	F. G. Legg.
Marlette	Jan. 12, 1914	Sewerage	E. D. Rich.
Marquette	Nov. 12, 1913	Water supply	E. D. Rich.
Mason	Nov. 8, 1913	Sewerage	E. D. Rich.
Menominee	June 19, 1914	Water supply	E. D. Rich.
Mesick	April 11, 1914	Water supply	D. W. Bingham.
Millington	Oct. 2, 1913	Sewerage system	E. D. Rich.
Morenci	Jan. 18, 1914	General sanitary conference	F. G. Legg.
Mt. Pleasant	Dec. 16, 1913	Sewerage	E. D. Rich.
Munising	Sept. 10, 11, '13	Typhoid epidemic	E. D. Rich.
Muskegon Heights	Feb. 16, 1914	Sewerage	E. D. Rich.
Muskegon Heights	May 19, 1914	Sewage disposal for Campbell, Wyant & Cannon Foundry	F. G. Legg.
Negaunee	Nov. 11, 12, '13	Water supply	E. D. Rich.
Niles	Nov. 14, 1914	Tannery nuisance	H. F. Vaughan.
North Muskegon	Nov. 13, 1914	Sewerage for school	H. F. Vaughan.
Onsted	May 4, 1914	Sewerage	F. G. Legg.
Petoskey	Aug. 14, 1913	Sewerage system	E. D. Rich.
Petoskey	May 27, 1914	Sewage disposal	F. G. Legg.
Pewamo	May 20, 1914	Sewerage	F. G. Legg.
Pontiac	May 12, 1914	Rendering works nuisance	E. D. Rich.
Pontiac	June 9, 1914	Stream pollution	E. D. Rich.
Port Huron	Oct. 3, 1914	Water supply	E. D. Rich.
Port Huron	Mar. 6, 1914	Water, typhoid	E. D. Rich.
Port Huron	Mar. 25, 1914	Sewerage	E. D. Rich.
Port Huron	June 11, 1914	Sewerage	E. D. Rich.
Redford	April 17, 1914	Sewage disposal for school	E. D. Rich.
Reed City	Jan. 21, 1914	Sewerage	E. D. Rich.
Reed City	May 27, 1914	Local nuisance	F. G. Legg.
Saginaw	Oct. 15, 1913	Water supply	E. D. Rich.
Saginaw	Dec. 4, 1913	Stream pollution	E. D. Rich.
Saginaw	Mar. 27, 1914	Trade wastes disposal	E. D. Rich.
Saline	Mar. 14, 1914	Water and sewer maintenance	E. D. Rich.
Saline	June 5, 1914	Stream pollution nuisance	E. D. Rich.
Saranac	June 2, 1914	Water supply	E. D. Rich.
Spring Lake	May 2, 1914	Sewerage and sewage disposal	D. W. Bingham.

TABLE NO. 14.—*Concluded.*

Location.	Date.	Subject.	Engineer.
Standish	Nov. 5,1913	Sanitary survey	H. F. Vaughan.
Standish	May 30,1914	Local nuisance and consultation with officials on general insanitary conditions	F. G. Legg.
Standish	June 26,1914	School sewerage	E. D. Rich.
St. Johns	July 15, 16,'13	Sewerage system	E. D. Rich.
Thompsonville	Mar. 18,1914	School house ventilation and sanitation	D. W. Bingham.
Three Oaks	June 9,1914	Sewage disposal	D. W. Bingham.
Traverse City	Feb. 3,1914	Sewerage	E. D. Rich.
Traverse City	Mar. 13,1914	Investigations	D. W. Bingham.
Vassar	Oct. 2,1913	Rubbish nuisance	E. D. Rich.
Wahjamega	Feb. 6,1914	Water supply	E. D. Rich.
Watervliet	Feb. 25,1914	Sewage nuisance in stagnant river	F. G. Legg.
Webberville	June 11,1914	Sewage disposal	D. W. Bingham.
West Branch	May 29,1914	Slaughter house nuisance	F. G. Legg.
Whitmore Lake	Mar. 3,1914	Ice inspection	D. W. Bingham.
Wyandotte	Jan. 16,1914	Water supply	E. D. Rich.
Ypsilanti	Mar. 4,1914	Ice inspection	D. W. Bingham.
Zeeland	July 31,1913	Cheese factory nuisance	E. D. Rich.
Zeeland	June 18,1914	Water supply	F. G. Legg.

Total, 142.

TABLE NO. 15.—*Summary of inspections, investigations and consultations to June 30, 1914.*

Subjects treated.	July to October, 1913.	October to January, 1914.	January to April, 1914.	April to July, 1914.
1. Water supply purity	3	6	7	9
2. Water supply, location and construction	0	0	1	1
3. Sewerage and sewage disposal	11	7	11	29
4. Drainage of storm and surface water	5	0	0	1
5. Stream and lake pollution	0	1	2	6
6. Trade wastes disposal	6	2	1	0
7. Nuisances	8	3	3	11
8. Typhoid fever investigations	3	3	0	0
9. Resort sanitation	20	0	0	0
10. School house sanitation	2	2	3	3
11. General sanitation	0	1	1	5
12. Plumbing inspections	0	0	0	0
13. Ice inspections	0	1	3	0
14. Inspection of jails	0	2	2	0
15. Garbage collection and disposal	1	1	0	1
16. Public addresses	0	0	0	0
17. Examination of plans and specifications for public buildings	14	5	3	5
Total	73	34	37	71

Total subjects treated, 215.

TABLE NO. 16.—*Summer resorts visited to June 30, 1914.*

Resort.	Location.	Inspector.	Date.
Bau Bees Lake	Hillsdale	E. D. Rich	Sept. 6,1913
Bay Port	Huron County	H. F. Vaughan	July 26,1913
Bay View	Emmet County	M. P. Gill	Aug. 4,1913
Bay View Camp Grounds	Bay View	E. D. Rich	Aug. 7,1913
Cavanaugh Lake	Chelsea	H. F. Vaughan	July 19,1913
Clarks Lake	Jackson County	E. D. Rich	Aug. 11,1913
Congregational Assembly	Frankfort	E. D. Rich	Aug. 7,1913
Detroit and St. Clair River Resorts		H. F. Vaughan	Aug. 12,1913
Devils Lake	Lenawee County	E. D. Rich	Aug. 19,1911
Devils Lake	Lenawee County	H. F. Vaughan	July 10,1913
Douglas Lake	Cheboygan County	E. D. Rich	Aug. 1,1913
Edgewood	Gd. Traverse County	H. F. Vaughan	Aug. 19,1913
Fisherman's Paradise	Bellaire	D. W. Bingham	May 9,1914
Fouch	Leelanau County	H. F. Vaughan	Aug. 20,1913
Frankfort	Benzie County	E. D. Rich	Aug. 22,1913
Goguac Lake	Battle Creek	E. D. Rich	Aug. 18,1913
Grand Haven	Ottawa County	A. J. Decker	June 24,1912
Gull Lake	Kalamazoo Township	A. H. Rockwell	June 4,1913
Gull Lake	Kalamazoo Township	A. H. Rockwell	July 7,9,1913
Hamlin Lake	Mason County	E. D. Rich	June 5,1912
Harbor Beach	Huron County	H. F. Vaughan	July 23,24,'13
Harbor Springs	Emmet County	E. D. Rich	July 29,1912
Ke-zis-make-saw	Gd. Traverse County	H. F. Vaughan	Aug. 19,1913
Lakeland	Livingston County	H. F. Vaughan	July 11,1913
Lake Michigan Park	Muskegon County	A. J. Decker	July 26,1912
Leland	Leelanau County	H. F. Vaughan	Aug. 30,1913
Long Lake	Genesee County	H. F. Vaughan	Aug. 13,1913
Neahtawanta	Gd. Traverse County	H. F. Vaughan	Aug. 18,1913
Old Mission	Gd. Traverse County	H. F. Vaughan	July 16,1913
Orchard Lake	Oakland County	E. D. Rich	Aug. 19,1913
Paw Paw Lake	Berrien County	E. D. Rich	Sept. 7,1912
Pentwater	Oceana County	E. D. Rich	July 3,1911
Portage Point	Manistee County	E. D. Rich	Aug. 23,1912
Port Austin and vicinity	Huron County	H. F. Vaughan	July 24,25,'13
Port Huron	St. Clair County	E. D. Rich	July 21,22,'13
Provemont	Leelanau County	H. F. Vaughan	Aug. 21,1913
Reeds Lake	East Grand Rapids	E. D. Rich	May 20,1912
Reeds Lake	East Grand Rapids	E. D. Rich	Aug. 20,1912
Reeds Lake	East Grand Rapids	E. D. Rich	Sept. 13,1913
Reeds Lake	East Grand Rapids	E. D. Rich	Sept. 26,1913
Roaring Brook	Emmet County	E. D. Rich	Aug. 8,1912
Skegamag Point	Gd. Traverse County	Dr. C. W. Bunce	July 12 1912
St. Joseph and Benton Harbor	Berrien County	A. J. Decker	July 10,13,'12
Watervliet	Berrien County	E. D. Rich	Sept. 7,1912
We-Que-Ton-Sing	Emmet County	E. D. Rich	Aug. 8,1912
Whites Hotel, Beulah	Benzie County	E. D. Rich	Oct. 8,1913
Whites Hotel, Beulah	Benzie County	D. W. Bingham	May 9,1914
Wing Lake, Birmingham	Oakland County	F. G. Legg	June 30,1914
Whitmore Lake	Washtenaw County	H. F. Vaughan	July 16,1913
Wolfe Lake	Jackson County	D. E. McClure	Aug. 24,1913

Total, 50.

LABORATORY DIVISION.

LABORATORY REPORT FOR THE FISCAL YEAR ENDING JUNE 30, 1914.

To the Secretary of the State Board of Health:

Dear Doctor:—I have the honor to herewith submit a report of the work done at the laboratory for the fiscal year ending June 30, 1914.

SUMMARY OF EXAMINATIONS FOR YEAR ENDING JUNE 30, 1914, COMPARED WITH SUMMARY OF EXAMINATIONS FOR YEAR ENDING JUNE 30, 1913.

	1914.	1913.
Total number of examinations	7,884	6,780
Chemical and bacteriological examinations of water for potability	1,136	1,103
Sputa and other discharges examined for tubercle bacilli	3,081	2,767
Throat swabs examined for diphtheria bacilli	1,290	963
Blood samples examined for Widal's reaction	832	848
Chemical and miscroscopical examinations of urine	127	150
Pathological examinations of feces	19	7
Pathological examinations of tumors	30	36
Miscellaneous blood examinations	32	46
Chemical and bacteriological examinations of milk	619	437
Examinations for venereal disease	497	160
Toxicological and medico-legal examinations	45	26
Beverages examined	44	68
Other miscellaneous examinations	132	169

SUMMARY OF EXAMINATIONS ARRANGED BY MONTHS.

Month.	Waters.		Sputa. Tuberculosis.		Throat Swabs. Diphtheria.		Blood. Widal's Reaction.		Smears. Venereal.		Miscellaneous.	Total.
	Safe.	Unsafe.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.		
July, 1913	78	50	54	138	29	51	10	58	10	23	84	585
August, 1913	78	32	67	151	35	47	28	69	13	34	130	684
September, 1913	76	50	46	173	50	39	33	82	7	33	68	657
October, 1913	98	33	57	150	34	74	33	82	10	42	125	738
November, 1913	79	26	40	148	43	70	34	44	7	38	89	618
December, 1913	67	23	66	183	81	93	11	38	13	43	80	698
January, 1914	53	18	60	236	57	70	4	40	6	32	82	658
February, 1914	48	14	57	190	31	63	8	39	4	48	73	575
March, 1914	68	18	78	224	26	80	15	32	2	40	51	634
April, 1914	70	10	61	257	21	95	14	50	6	36	119	739
May, 1914	57	13	74	261	28	73	2	40	8	29	70	655
June, 1914	50	27	64	246	40	60	9	57	7	6	77	643
Total	822	314	724	2,357	475	815	201	631	93	404	1,048	7,884

SUMMARY OF WATER EXAMINATIONS FOR THE YEAR ENDING JUNE 30, 1914.

Location.	Safe.	Unsafe.	No. examined.
Adrian	2	2	4
Ahmeek	0	1	1
Albion	2	1	3
Algonac	1	2	3
Allen	3	2	5
Allenton	0	3	3
Alpena	103	24	127
Amasa	4	1	5
Amble	1	0	1
Bailey	0	1	1
Baltic	0	2	2
Battle Creek	3	0	3
Bay City	30	3	33
Bay Mills	1	0	1
Belding	3	2	5
Belleville	2	2	4
Bellevue	3	3	6
Benton Harbor	10	3	13
Berrien Springs	0	1	1
Birch Run	0	1	1
Blissfield	2	1	3
Boyne City	2	0	2
Brighton	1	0	1
Burlington	0	1	1
Cadillac	8	4	12
Caledonia	2	1	3
Capac	0	1	1
Carson City	0	1	1
Carsonville	1	0	1
Cass City	3	1	4
Cassopolis	4	2	6
Cathro	0	1	1
Cedar	5	0	5
Cedar Springs	1	0	1
Charlotte	2	1	3
Cheboygan	0	1	1
Clarkston	1	0	1
Clayton	3	0	3
Climax	0	2	2
Clio	3	2	5
Colon	1	0	1
Comstock	1	0	1
Coopersville	0	1	1
Copemish	1	0	1
Covert	0	1	1
Crystal Falls	2	1	3
Davison	1	1	2
Decatur	0	1	1
Deckerville	1	0	1
Detroit	1	2	3
Dexter	0	1	1
Dowagiac	1	0	1
Durand	4	2	6
East Jordan	3	0	3
East Tawas	0	1	1

Location.	Safe.	Unsafe.	No. examined.
Eaton Rapids	15	9	24
Elk Rapids	1	1	2
Entrican	1	0	1
Essexville	1	0	1
Fair Haven	1	0	1
Flint	12	3	15
Ford	0	2	2
Fosters	1	0	1
Frankfort	10	0	10
Gagetown	1	0	1
Galien	1	0	1
Ganges	2	0	2
Gaylord	0	1	1
Gladstone	5	3	8
Grand Ledge	3	0	3
Grand Rapids	17	7	24
Grayling	1	1	2
Greenfield	1	11	12
Greenland	0	1	1
Greenville	1	0	1
Hancock	3	1	4
Hartford	1	1	2
Haslett	3	0	3
Hastings	2	2	4
Hillman	1	0	1
Hillsdale	7	0	7
Holland	38	17	55
Holly	0	1	1
Honor	1	0	1
Houghton	2	0	2
Howard City	1	0	1
Howell	1	0	1
Hudson	1	0	1
Imlay City	1	0	1
Ionia	1	0	1
Iron Mountain	3	0	3
Ironwood	9	3	12
Ishpeming	2	0	2
Ithaca	2	0	2
Jackson	3	3	6
Jenison	2	0	2
Jonesville	1	1	2
Kalamazoo	6	2	8
Lake Mine	2	1	3
L'Anse	2	1	3
Lansing	17	2	19
Lapeer	1	2	3
LaSalle	1	0	1
Lawrence	7	0	7
Lawton	1	0	1
Leslie	0	2	2
Ludington	6	0	6
Lyons	1	0	1
Macon	0	2	2
Mancelona	1	0	1

Location.	Safe.	Unsafe.	No. examined.
Manistee	8	2	10
Marcellus	2	2	4
Marine City	1	0	1
Marlette	2	0	2
Marquette	11	0	11
Martin	2	0	2
Mason	1	5	6
Menominee	2	1	3
Mesick	2	0	2
Midland	1	2	3
Milan	1	0	1
Monroe	2	3	5
Morley	5	2	7
Morrice	1	1	2
Mulliken	0	1	1
Munising	8	5	13
Muskegon	6	1	7
Nashville	19	16	35
Negaunee	11	3	14
New Boston	0	1	1
Niles	3	1	4
North Muskegon	4	1	5
Northport	1	0	1
Ogden Center	2	1	3
Olivet	3	0	3
Onaway	0	1	1
Onsted	0	2	2
Ontonagon	2	1	3
Ortonville	0	1	1
Osseo	1	0	1
Otia	0	1	1
Otsego	1	2	3
Ottawa Lake	0	3	3
Ovid	2	0	2
Owosso	9	0	9
Palmyra	0	1	1
Parma	1	0	1
Paw Paw	5	3	8
Pentwater	1	0	1
Perry	3	0	3
Petersburg	0	1	1
Petoskey	3	0	3
Pigeon	2	3	5
Plainwell	1	0	1
Plymouth	3	0	3
Pontiac	2	1	3
Portage Lake	0	1	1
Port Austin	1	0	1
Port Huron	71	7	78
Portland	0	1	1
Railroad samples	32	7	39
Rapid River	0	1	1
Reed City	1	0	1
Rochester	0	1	1
Rockland	3	0	3
Rogers	1	0	1
Rollin	0	1	1
Royal Oak	1	0	1
Rushton	1	0	1

Location.	Safe.	Unsafe.	No. examined.
Saganing	1	0	1
Saginaw	8	6	14
Saline	2	1	3
Saranac	1	0	1
Sault Ste. Marie	4	0	4
Sawyer	0	1	1
Schoolcraft	2	1	3
Scottville	1	0	1
Sebewaing	1	1	2
Shabbona	1	0	1
Shaftsburg	1	1	2
Shingleton	0	1	1
South Haven	36	6	42
South Lyon	0	1	1
Sparta	0	2	2
Spring Harbor	1	0	1
Stephenson	1	0	1
Sturgis	1	5	6
Tawas City	0	1	1
Temperance	2	0	2
Three Oaks	0	1	1
Three Rivers	1	0	1
Traverse City	2	1	3
Trenton	1	1	2
Turner	0	6	6
Ubly	2	0	2
Union	1	0	1
Union City	1	0	1
Unknown	10	4	14
Wahjamega	5	0	5
Wakefield	1	1	2
Washington	1	0	1
Watersmeet	1	0	1
Watervliet	11	4	15
Wayland	2	2	4
Weidman	2	0	2
White Cloud	1	1	2
White Pigeon	0	1	1
Wilber	0	2	2
Williamston	0	1	1
Wilson	0	1	1
Wixom	1	0	1
Wyandotte	7	10	17
Ypsilanti	1	0	1
Zeeland	12	2	14

SUMMARY OF SPUTA EXAMINATIONS.

Total number of sputa examined for tubercle bacilli		3,081
Total number positive	724	
Total number negative	2,357	

Other organisms associated with tubercle bacilli in sputa:

Streptococci, 42	B. Influenza, 6
Staphylococci, 26	M. Catarrhalis, 2
Pneumococci, 15	Mixed bacteria, 413

Other organisms absent or not identified, 220

Other organisms predominating where tubercle bacilli were absent:

Streptococci, 162	B. Influenza, 21
Staphylococci, 219	Micrococcus Catarrhalis, 2
Pneumococci, 86	Mixed bacteria, 1,318

Other organisms absent or not identified, 549

SUMMARY OF THROAT SWABS EXAMINED.

Total number of throat swabs examined		1,290
Total number showing B. Diphtheria	475	
Total number showing absence of B. Diphtheria	815	
Total number of throat swabs examined for release from quarantine		535
Total number showing B. Diphtheria present	153	
Total number showing B. Diphtheria absent	382	
Total number of throat swabs examined for diagnosis		755
Total number showing B. Diphtheria present	322	
Total number showing B. Diphtheria absent	433	
Total number of throat swabs examined from cases where previous diagnosis of diphtheria had been made from clinical findings		207
Total number showing B. Diphtheria present	133	
Total number showing B. Diphtheria absent	74	
Per cent of cases of clinical diphtheria not caused by B. Diphtheria		36
Total number of throat swabs examined where clinical diagnosis was regarded as questionable		331
Total number showing B. Diphtheria present	132	
Total number showing B. Diphtheria absent	199	
Per cent of questionable cases found to be diphtheria		40
Total number of throat swabs examined from cases where previous diagnosis other than diphtheria has been made		217
Total number showing B. Diphtheria present	63	
Total number showing B. Diphtheria absent	154	
Per cent found to be diphtheria		29

Other organisms identified when associated with B. Diphtheria in swabs examined for diagnosis:

Staphylococci, 17	Pneumococci, 29
Bacillus Fusiformis, 9	Bacillus Influenza, 1
Micrococcus Catarrhalis, 1	

Other organisms found to predominate in cases that were considered diphtheria clinically but not diphtheria bacteriologically:

	Swab	Culture
Streptococci	4	3
Staphylococci	19	50
Pneumococci	27	15
Micrococcus Catarrhalis	1	1
Bacillus Fusiformis	7	0
Saccharomyces	0	3

Bacillus Fusiformis was found to predominate in direct smear from swab 46 times. The culture from these smears showed the following:

Streptococci, 1
Staphylococci, 25
Bacillus Diphtheria, 9
Micrococcus Catarrhalis, 3
Pneumococci, 5
Unidentified, 3

Organisms found to predominate in negative cases of suspected diphtheria:

	Swab	Culture
Streptococci	1	10
Staphylococci	38	126
Pneumococci	63	37
Micrococcus Catarrhalis	8	9
Bacillus Influenza	2	1
Bacillus Fusiformis	19	0
Saccharomyces	0	4
Bacillus Mucosus Capsulatus	0	2
Leptothrix	1	0
No organism present or not identified	3	9

Respectfully,
M. L. HOLM,
Bacteriologist.

FINANCIAL STATEMENT.

TOTAL AMOUNT AND CLASSIFICATIONS OF EXPENDITURES BY THE STATE BOARD OF HEALTH (UNDER PUBLIC ACT 155 OF 1913) DURING THE FISCAL YEAR ENDING JUNE 30, 1914.

Expenses of members:	
Attending regular meetings	$163 45
Other expenses	79 41
Engraving, drawing, etc	389 94
Instruments and books	1,392 68
Paper, stationery, etc	2,699 14
Postage	1,500 00
Printing and binding	3,792 58
Secretary	2,500 00
Miscellaneous	2,198 47
Total	$14,715 67

NOTE.—The appropriation ($15,000) at the disposal of the State Board of Health for certain specified purposes, does not include clerk hire. The account of the appropriation ($12,000) for clerk hire is kept in the Auditor General's Department, and is published in his annual report.

Respectfully submitted,
JNO. L. BURKART,
Secretary.

TOTAL AMOUNT AND CLASSIFICATION OF EXPENDITURES BY THE STATE BOARD OF HEALTH (UNDER SECTION 7, OF ACT 132, LAWS OF 1903, AS AMENDED BY ACT 151, LAWS OF 1907) EMBALMERS' FUND AS ALLOWED DURING THE FISCAL YEAR, 1914.

RECEIPTS.		DISBURSEMENTS.	
Fees from applicants for licenses and for renewals of licenses	$1,195 50	Expenses of members attending meetings	$218 62
		Paper, stationery, etc	65 49
		Postage	520 00
		Printing and binding	205 16
		Drawing, engraving, etc	52 00
		Express	13 86
		Telephone toll	2 45
		Miscellaneous	117 83
		To State Treasurer (unexpended amount) to balance account	09
Total receipts	$1,195 50	Total disbursements	$1,195 50

Approved:
JNO. L. BURKART,
Secretary.

TOTAL AMOUNT AND CLASSIFICATION OF EXPENDITURES BY THE STATE BOARD OF HEALTH, LABORATORY, (UNDER SECTION 5 OF ACT 122, LAWS OF 1909), AS ALLOWED DURING THE FISCAL YEAR ENDING JUNE 30, 1914.

RECEIPTS.		DISBURSEMENTS.	
State Treasurer, by appropriation	$5,000 00	Salaries of bacteriologist and assistant	$3,700 00
Fees for chemical, bacteriological and toxicological examinations.	671 96	Salaries of clerks	1,447 40
		Postage	138 00
		Express, freight and cartage	1 67
		Printing and stock	3 08
		Laboratory supplies	318 61
		Traveling expenses	56 27
		Miscellaneous	6 00
		Unexpended balance	93
Total receipts	$5,671 96	Total disbursements	$5,671 96

DIVISION OF COMMUNICABLE DISEASES.

DIVISION OF COMMUNICABLE DISEASES.

During the year 1913 efforts have been made to lessen the prevalence of several diseases which have recently been added to the list of reportable diseases, while our endeavors along the line of preventive medicine, in the more popularly known communicable diseases, have been continued with greater zeal than in previous years, and by this means we have been able to check, in their incipiency, several outbreaks of communicable diseases which otherwise might have resulted disastrously, not only to the community attacked, but to the entire state.

The history of the various communicable diseases during the year 1913, as well as for past years, are contained in the tables on subsequent pages of this report, and which might well be studied by all persons interested in the prevention of these diseases.

POPULATION.

To obtain correct and complete Vital Statistics it is essential to have a correct enumeration of the population classified according to age, sex, etc., together with a complete and accurate registration of sickness and death. In comparing the Vital Statistics of different communities, or one year with another in the same community, it is necessary to state the deaths and other statistical data in terms of the population, otherwise no true comparison can be instituted.

The actual population is known only by census enumerations. For years intervening between two census enumerations, estimates of the population are made.

Table showing the populations of Michigan for the years 1884-1912.

Years.	*Population.
1884	**1,853,658**
1885	1,893,697
1886	1,933,735
1887	1,973,774
1888	2,013,812
1889	2,053,851
1890	**2,093,889**
1891	2,130,827
1892	2,167,765
1893	2,204,703
1894	**2,241,641**
1895	2,271,531
1896	2,301,421
1897	2,331,311
1898	2,361,201
1899	2,391,091
1900	**2,420,982**
1901	2,450,872
1902	2,475,499
1903	2,502,758
1904	**2,530,016**
1905	2,557,275
1906	2,584,533
1907	2,611,792
1908	2,639,050
1909	2,666,309
1910	**2,810,173**
1911	2,856,866
1912	2,903,559
1913	2,950,251

*Population in bold faced type indicates census years, population for other years being estimated.

PNEUMONIA IN MICHIGAN IN 1913 AND PRECEDING YEARS.

GENERAL PREVALENCE.

This disease (pneumonia) became reportable to this Board in the year 1904. In other words, this Board came to the conclusion, after due deliberation, that pneumonia is a communicable disease, and that all the cases and deaths occurring therefrom should be reported to this Board, and the same be compiled and studied with a view of reducing the prevalence of this disease in Michigan.

How well the physicians of the State are reporting the non-fatal cases attended by them, may be seen by referring to Table 1, by which it will be noted that the number of non-fatal cases exceeded the fatal cases by only 22 per cent. Owing to the fact that so few non-fatal cases are being reported, it is necessary to base the study, as to the reduction of the prevalence of this disease, on the data pertaining to the fatal cases only, instead of upon data pertaining to the non-fatal cases as well.

In 1913, as may be seen by the above-mentioned table, there were reported to this Board 3,687 cases of pneumonia, of which number 2,894, or 78 per cent, proved fatal. These deaths correspond to an annual rate of 98.1 per 100,000 of the population at all ages. This rate is slightly higher than the rate for the preceding year, and is also higher than the average rate for the preceding five years.

TABLE 1.—*The prevalence of pneumonia, in Michigan, in each of the sixteen years, 1898-1913.*

Years.	*Cases.	Deaths.	Deaths per 100,000 population.
1898	.....	2,047	86.7
1899	.....	2,479	103.7
1900	.....	2,388	98.6
1901	.....	2,901	118.4
1902	.....	2,637	106.5
Average, 1898-1902	.....	2,490	102.9
1903	.....	2,607	104.2
1904	3,790	2,646	104.6
1905	3,227	2,417	94.5
1906	3,387	2,621	101.4
1907	3,976	3,018	115.6
Average, 1903-1907	3,595	2,662	104.1
1908	3,177	2,313	87.6
1909	3,142	2,265	84.9
1910	3,671	2,785	99.1
1911	3,452	2,763	96.7
1912	3,592	2,796	96.3
Average, 1908-1912	3,407	2,584	93.1
1913	3,687	2,894	98.1

*Previous to 1904 pneumonia was not reported to this Department.

GEOGRAPHICAL DISTRIBUTION OF PNEUMONIA.

Table 2 was designed for the purpose of determining the influence of climatic conditions, in the several divisions of the State, on the prevalence of pneumonia, but the great difficulty encountered in separating this influence from other environments, such as variations of the age-distribution of population, industries, nativity, density of population, etc., being so great, and many of the data necessary to accomplish this not being available, it is impossible to state just what part this factor plays in the prevalence of this disease. Nevertheless, the data contained in this table are very important, enabling one to determine the prevalence of this disease in each section of the State and the counties constituting the same.

As indicated by the death rates per 100,000 of the population, as shown in Table 2, it will be noted that pneumonia, in 1913 and during the years, 1904-1912, was most prevalent in the Southern group of counties, and least prevalent in the Northern group.

In 1913 there is a slight reduction in the death rates, compared with their average rate, in each division excepting the Southern, where the death rate shows an increase of 7 per cent.

The individual counties, in which unusually high death rates were recorded in 1913, were: Delta (154.8) and Luce (172.2) of the Upper Peninsular division; Roscommon (157.1) of the Northern division, and Wayne county (198.8) of the Southern division. With the single exception of Bay county, the counties of the Central division, in 1913, experienced death rates that were less than the rate for the State as a whole.

TABLE 2.—*Showing the cases, deaths and death rates per 100,000 population from pneumonia, in Michigan and in each of the counties of the State for the year 1913, also the averages for the years, 1904-1912, inclusive.*

State and counties by geographical sections.	1913.			Average, 1904-1912.		
	Cases.	Deaths.	Deaths per 100,000 population	Cases.	Deaths.	Deaths per 100,000 population.
STATE OF MICHIGAN	**3,687**	**2,894**	**98.1**	**3,494**	**2,625**	**97.7**
I.—Upper Peninsula	**383**	**294**	**83.8**	**382**	**278**	**92.4**
Alger	13	6	72.8	8	7	94.9
Baraga	5	4	60.3	9	5	89.6
Chippewa	24	23	89.7	30	22	96.1
Delta	49	49	154.8	35	32	108.7
Dickinson	17	10	46.9	19	16	78.9
Gogebic	21	21	79.7	19	18	88.3
Houghton	76	71	73.3	111	80	101.1
Iron	24	18	98.5	13	11	96.2
Keweenaw	6	4	47.3	14	5	76.3
Luce	7	7	172.2	5	5	116.2
Mackinac	3	3	30.8	7	6	68.9
Marquette	95	46	91.8	65	37	87.9
Menominee	20	19	75.3	26	24	92.2
Ontonagon	11	3	31.9	10	5	61.4
Schoolcraft	12	10	114.9	11	5	60.8
II.—Northern Counties	**298**	**207**	**62.3**	**383**	**266**	**79.1**
Alcona	1	1	17.5	5	4	52.3
Alpena	22	22	109.6	18	18	88.5
Antrim	16	14	89.1	17	12	78.5
Arenac	6	4	42.7	9	9	90.0
Benzie	5	5	47.3	12	10	88.4
Charlevoix	16	10	48.5	21	13	69.6
Cheboygan	14	13	71.5	20	16	87.2
Clare	8	4	43.2	10	5	52.4
Crawford	5	4	100.7	5	4	88.6
Emmet	13	13	68.8	22	15	77.3
Gladwin	6	3	36.1	7	5	58.1
Grand Traverse	14	13	54.0	27	20	80.1
Iosco	1	1	10.7	8	7	67.6
Kalkaska	5	5	59.9	6	5	66.7
Lake	6	3	61.1	5	3	51.2
Leelanau	7	5	47.6	10	8	72.7
Manistee	43	19	71.8	52	23	84.9
Mason	12	12	52.3	24	18	88.8
Missaukee	7	7	65.0	13	12	113.2
Montmorency	4	3	77.4	6	3	92.5
Ogemaw	10	10	113.6	11	10	99.5
Osceola	30	9	51.4	21	13	69.1
Oscoda	2	1	47.7	5	2	84.0
Otsego	2	2	32.2	8	6	83.9
Presque Isle	11	7	61.2	10	8	70.2
Roscommon	4	4	157.1	4	1	75.3
Wexford	28	13	60.3	27	16	75.2
III.—Central Counties	**405**	**352**	**76.6**	**502**	**395**	**86.1**
Bay	80	79	111.8	73	63	96.3
Gratiot	29	14	50.1	37	27	88.8
Huron	29	28	80.8	32	27	76.4
Isabella	24	19	84.5	38	20	82.5
Mecosta	14	14	73.3	23	16	82.2
Midland	11	11	80.4	16	13	91.4
Montcalm	26	21	66.7	32	27	80.5
Muskegon	36	34	80.6	48	39	100.6
Newaygo	7	6	30.6	18	12	63.0
Oceana	18	10	53.4	20	16	84.4
Saginaw	76	70	76.8	89	78	87.5
Sanilac	29	23	68.7	34	27	77.5
Tuscola	26	23	66.9	42	30	84.6

TABLE 2.—*Concluded.*

State and counties by geographical sections.	1913.			Average, 1904-1912.		
	Cases.	Deaths.	Deaths per 100,000 population	Cases.	Deaths.	Deaths per 100,000 population
IV.—Southern Counties	**2,601**	**2,041**	**113.0**	**2,227**	**1,689**	**106.0**
Allegan	32	20	49.7	43	31	77.7
Barry	7	6	26.2	27	17	77.1
Berrien	67	40	71.8	45	31	60.2
Branch	35	14	55.6	23	15	59.2
Calhoun	76	32	54.7	87	49	87.0
Cass	17	13	62.1	23	17	84.8
Clinton	18	14	63.4	29	18	72.8
Eaton	34	26	85.5	40	27	89.0
Genesee	107	60	79.5	74	54	104.8
Hillsdale	28	23	77.7	30	21	70.2
Ingham	53	29	49.9	56	35	71.0
Ionia	28	24	72.7	38	27	79.9
Jackson	45	37	65.4	88	44	89.4
Kalamazoo	135	53	80.6	114	59	104.6
Kent	189	117	69.9	179	142	94.4
Lapeer	42	23	90.1	49	31	117.4
Lenawee	56	45	95.1	53	39	78.6
Livingston	24	13	75.2	22	14	75.8
Macomb	33	32	98.8	36	28	84.9
Monroe	35	27	82.0	40	31	93.3
Oakland	54	34	66.0	73	50	105.9
Ottawa	28	21	44.8	52	31	70.5
St. Clair	40	28	55.2	64	49	89.1
St. Joseph	22	22	82.6	26	23	98.4
Shiawassee	26	24	72.7	38	22	67.1
Van Buren	59	26	80.5	37	26	75.3
Washtenaw	43	37	84.7	54	39	84.9
Wayne	1,268	1,201	198.8	787	719	156.7

INFLUENCE OF DENSITY OF POPULATION ON THE PREVALENCE OF PNEUMONIA.

In determining the relation of density of population and the mortality from pneumonia, the more correct method to adopt would be to classify the localities according to the number of persons to each square mile, and state the death rate for each classification; but as these data are not available for each of the cities noted in Table 3, the next best method has been adopted, i. e., grouping the cities according to their size and stating the death rates for each group.

It will be noted, by reference to the above table, that the group of cities having the largest population has the highest death rate, and that the average death rate decreases with the decrease in the population of each group.

From the above fact it would be inferred that density of population has a direct influence on the prevalence of pneumonia. On the average this may be true, but for single years it may not, as, for instance, in 1913 the group of cities of from 25,000 to 50,000 population experienced a lower death rate than did the group of a less population.

Of the cities shown in the table, the highest death rates recorded in 1913 were in Escanaba, with a death rate of 245.8 per 100,000 population, and in Detroit, where the rate was 204.1.

It could hardly be assumed that the extremely high death rate in Escanaba was influenced by the density of population, owing to the size of the city. Factors that would be more likely to have had an influence on this death rate are age-distribution and nativity of population. But in Detroit, where the density of population is undoubtedly very great, this factor plays a very important part in the prevalence of not only pneumonia, but other diseases.

TABLE 3.—*The deaths and death rates per 100,000 inhabitants from pneumonia, in cities of Michigan of 10,000 population and over, in 1913, also the average number of deaths and the rates for the years, 1904-1912.*

Cities.	1913.		Average, 1904-1912.	
	Deaths.	Deaths per 100,000 inhabitants.	Deaths.	Deaths per 100,000 inhabitants.
CITIES OVER 50,000 INHABITANTS	1,216	170.5	852	155.5
Detroit	1,087	201.4	695	177.2
Grand Rapids	80	66.1	106	100.3
Saginaw	49	93.4	51	102.2
CITIES FROM 25,000 TO 50,000 INHABITANTS	224	84.3	228	111.0
Battle Creek	15	56.0	26	104.3
Bay City	61	128.6	48	117.3
Flint	44	87.3	31	124.8
Jackson	23	66.7	28	101.0
Kalamazoo	39	88.1	47	131.4
Lansing	21	57.2	19	65.3
Muskegon	21	81.9	29	130.9
CITIES FROM 10,000 TO 25,000 INHABITANTS	185	105.9	181	110.1
Adrian	10	92.5	11	98.7
Alpena	15	116.6	12	94.1
Ann Arbor	19	127.3	16	108.8
Escanaba	35	245.8	18	143.7
Ironwood	6	42.2	8	71.2
Ishpeming	15	166.6	14	124.3
Manistee	4	32.2	11	92.2
Marquette	14	117.4	13	115.6
Menominee	10	97.9	13	128.1
Pontiac	19	116.2	20	156.7
Port Huron	15	82.1	21	104.7
Sault Ste. Marie	17	121.2	14	114.1
Traverse City	6	47.8	10	81.9

SEASONAL PREVALENCE OF PNEUMONIA.

The influence of the seasons on the prevalence of pneumonia can be easily stated in figures, differing, in this respect, to the other influences just considered.

In Table 4, the figures in the column captioned "Monthly deaths reduced to a standard of 100," show that both broncho and other forms of pneumonia are most prevalent during the month of February and least prevalent during the month of August.

Perhaps it would not be out of place to explain the method employed in reducing the monthly deaths to a standard of 100. To determine the seasonal prevalence of a disease it is necessary to state the number of deaths for each month of the year, that is, when the seasonal prevalence is based on the fatal cases, as it is for this disease, for the reason that, as previously stated, only a small number of the non-fatal cases are reported. The object of this is to give the relative incidence of the disease in each month, and for this purpose a correction is required for the varying lengths of the months. The following example is noted:

The standard month is assumed to contain 31 days. The average number of deaths from broncho pneumonia in 31 days $= \frac{567 \times 31}{365} = 48.$

In January, there occurred, on the average, 75 deaths from broncho pneumonia in 31 days, therefore the deaths in this month were $\frac{75 \times 100}{48} = 156.3$ per cent of the standard.

Similarly for February, first find what would have been the number of deaths had this month had 31 days in it. $\frac{78 \times 31}{28} = 86.$ Then the deaths in the second month of 31 days were $\frac{86 \times 100}{48}$ $= 179.2$ per cent of the standard. And so on for the other months.

TABLE 4.—*The seasonal prevalence of pneumonia, in Michigan, as indicated by the average number of deaths from the two forms of this disease in each month in the sixteen years, 1898-1913.*

Month.	Pneumonia.			
	Broncho.		Other forms.	
	Average number of deaths occurring in each month during the years 1898-1913.	Monthly deaths reduced to a standard of 100.	Average number of deaths occurring in each month during the years 1898-1913.	Monthly deaths reduced to a standard of 100.
January	75	156.3	278	161.6
February	78	179.2	310	186.0
March	85	177.1	305	177.3
April	67	143.8	254	152.3
May	50	104.2	191	111.1
June	31	66.7	95	57.0
July	17	35.4	53	30.8
August	17	35.4	45	26.2
September	20	43.8	60	36.0
October	29	60.4	94	54.7
November	42	89.6	140	84.3
December	56	116.7	206	119.8
Annual average	567	100.0	2,031	100.0

AGE DISTRIBUTION OF PNEUMONIA.

In Table 5 are shown the average death rates from pneumonia per 100,000 population of the various age groups. A study of this table will enlighten one as to the reason why age-distribution of population is a factor in the prevalence of this disease.

Considering the form of broncho pneumonia separately, it will be noted that those under one year of age experience the highest death rate from this form of pneumonia, the rate being 419.3. After this age the death rate decreases with the advancement of age until the age group of 10-19 years is reached, when the minimum rate (1.6) is noted. Beginning with the 20th year of life the death rate increases, but very slightly, with the advancement of age up to the 70th year, when there is a sharp upward incline in the rate.

The maximum death rate from other forms of pneumonia occurs at the ages of 80 years and over, differing in this respect from broncho pneumonia, as the highest death rate from this form occurs at the age of under one year. But like broncho pneumonia, the rate decreases after the first year of life as the ages increase until the 10-19 year age group is reached, when the minimum rate again occurs, after which age the rate increases with the advancement of age.

The diagrams following Table 5 graphically represent the death rates from broncho and other forms of pneumonia by age groups.

TABLE 5.—*The influence of age in fatal cases of broncho and other forms of pneumonia, in Michigan, as indicated by the average number of annual deaths from this disease occurring at each age group and the death rates per 100,000 population of the same age during the years, 1898-1913, inclusive.*

Age groups.	Pneumonia.			
	Broncho.		Other forms.	
	Average annual number of deaths during the years 1898-1913.	Death rates per 100,000 population of same age.	Average annual number of deaths during the years 1898-1913.	Death rates per 100,000 population of same age.
ALL AGES	568	21.7	2,031	77.8
Under 1 year	251	419.3	400	669.3
Under 5 years	381	136.2	615	219.8
5-9 years	16	5.8	51	19.0
10-19 years	8	1.6	94	18.3
20-29 years	9	2.1	135	29.5
30-39 years	12	3.2	149	40.5
40-49 years	12	4.0	174	59.1
50-59 years	19	9.0	192	90.6
60-69 years	34	24.9	240	178.5
70-79 years	48	75.0	249	392.4
80 years and over	30	175.2	130	767.1
Unknown	.3	.....	3	.....

DIAGRAM SHOWING THE AVERAGE DEATH RATES FROM BRONCHO PNEUMONIA PER 100,000 OF POPULATION OF EACH AGE GROUP, IN MICHIGAN, DURING THE YEARS, 1898-1913, INCLUSIVE.

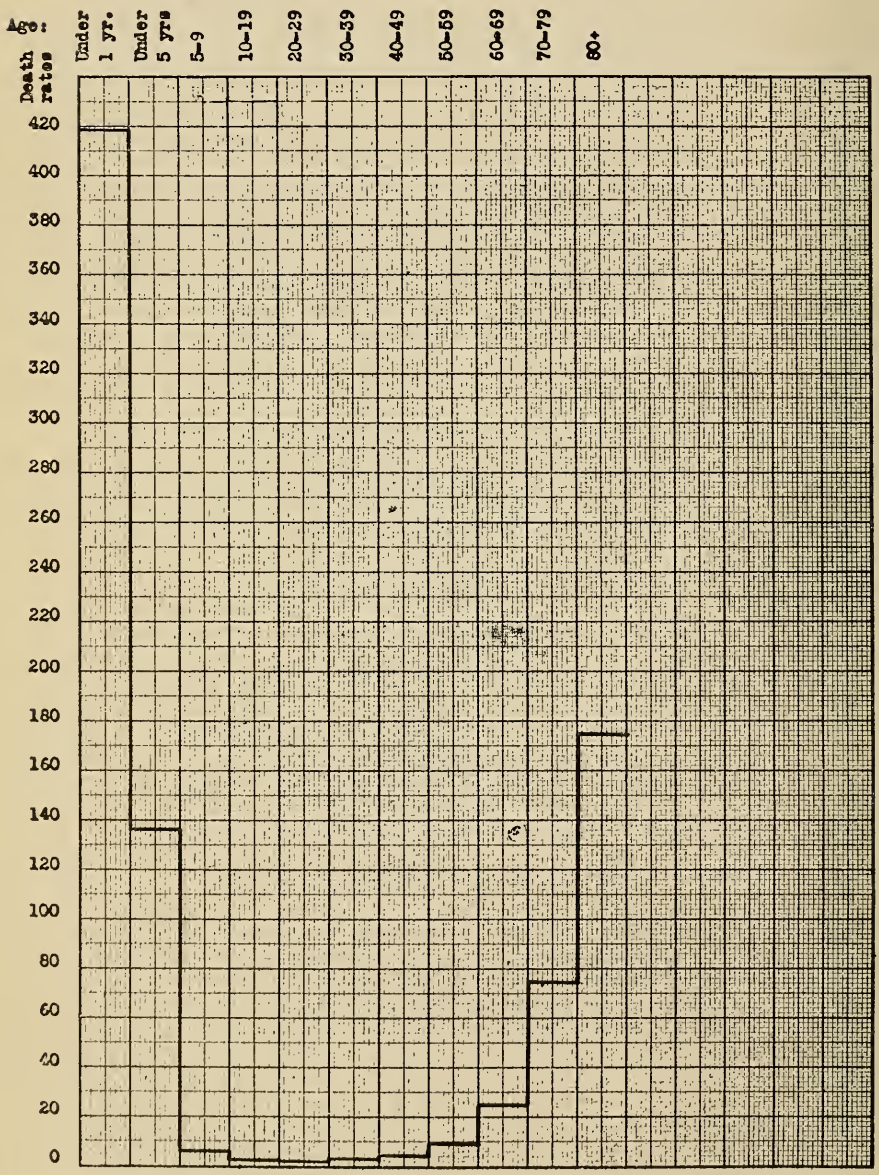
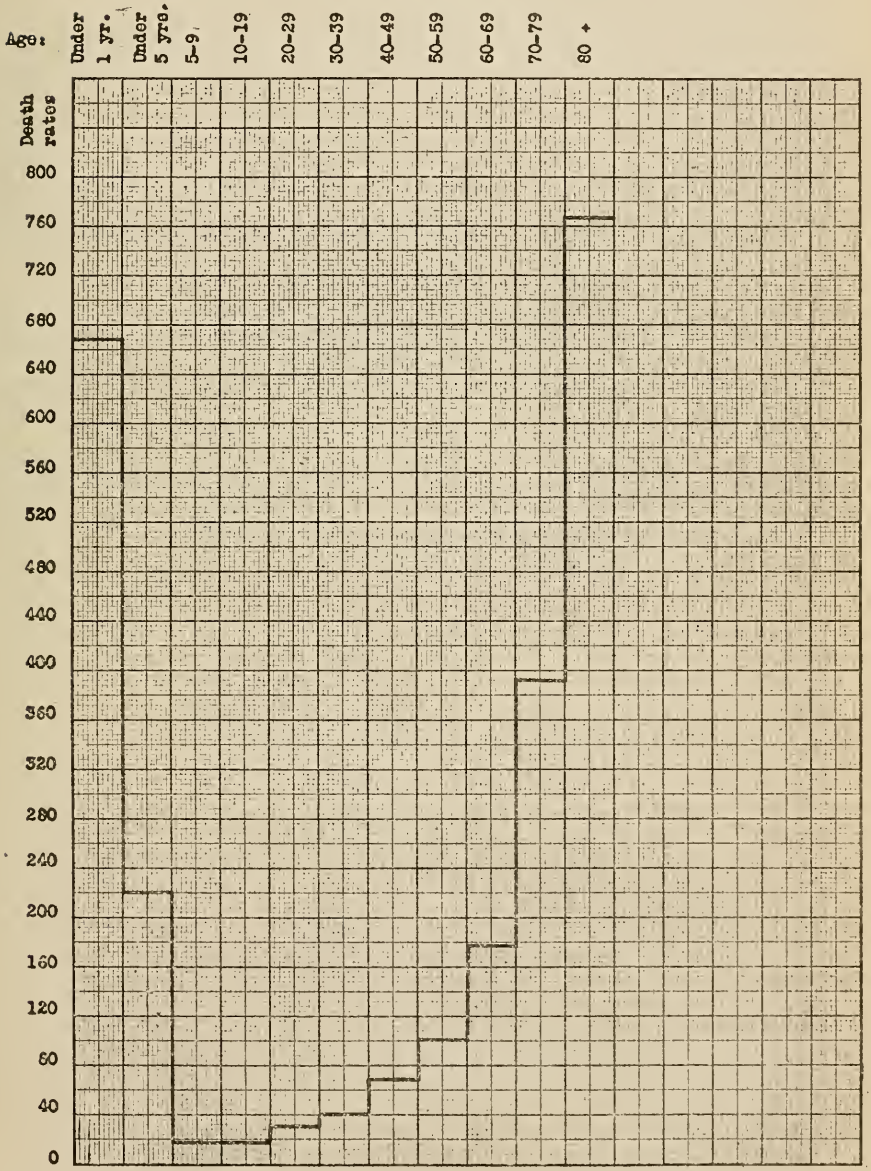


DIAGRAM SHOWING THE AVERAGE DEATH RATES FROM PNEUMONIA (OTHER THAN BRONCHO) PER 100,000 OF POPULATION OF EACH GROUP, IN MICHIGAN, DURING THE YEARS, 1898-1913, INCLUSIVE.



SEX DISTRIBUTION OF PNEUMONIA.

By reference to Table 6 and the diagram following, it will be noted that, on the average, the death rate from all forms of pneumonia is higher among the male population. It will also be noticed that the broncho pneumonia death rate of each sex is increasing, while the death rate from other forms of pneumonia is on the decrease among both sexes.

The increase in the broncho pneumonia death rate is, undoubtedly, only apparent, this increase being due, it is believed, to the greater care exercised by physicians in stating specifically the form of pneumonia causing death. The increase in the broncho pneumonia death rate, if due to the above reason, would account then, to that extent, for the decrease in the death rate from other forms of pneumonia, to which these deaths were formerly accredited.

The female death rate from pneumonia, other than broncho, was less than the male death rate during every year shown in the table. There is also a larger percentage of decrease in the female death rate, compared with the decrease in the death rate of the males.

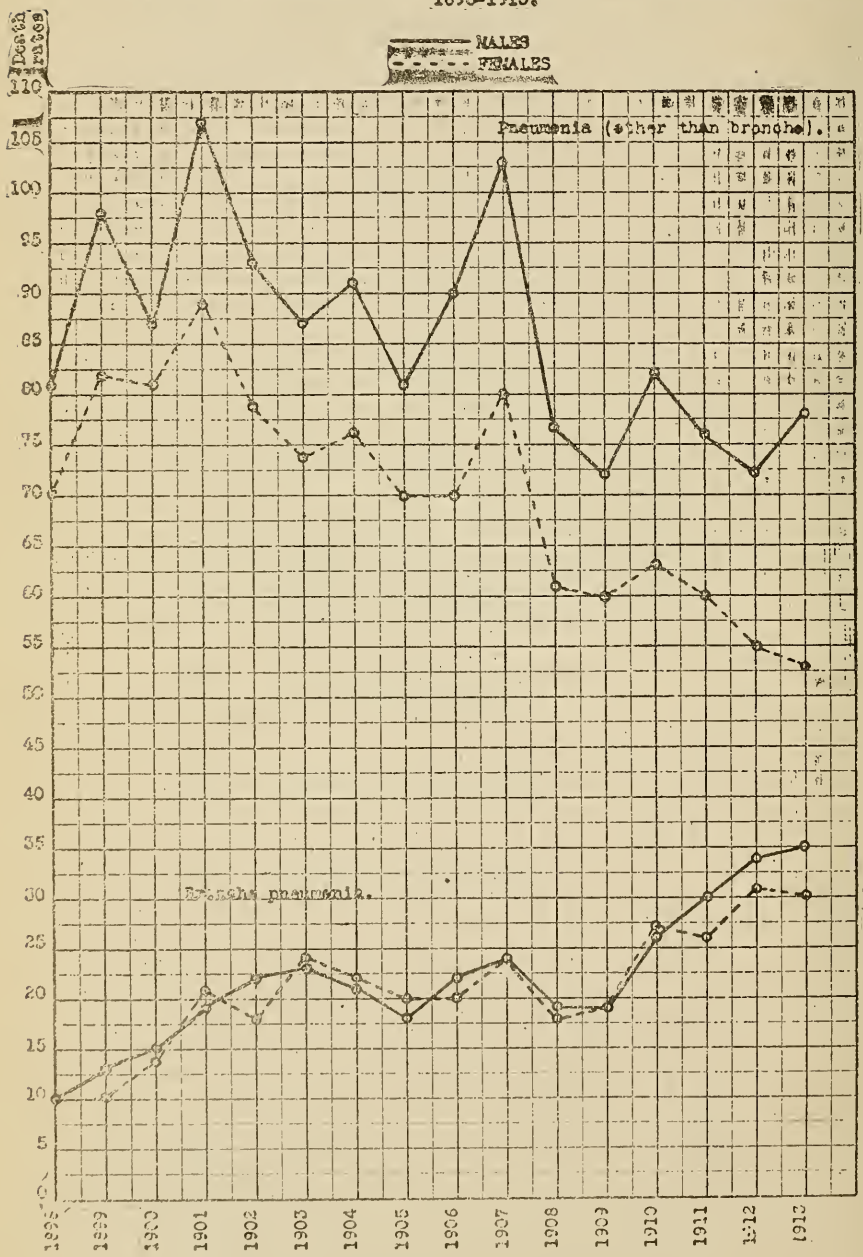
In order to better illustrate the meaning of the difference in the death rates of the two sexes, let us imagine the entire population to consist of females, without any alteration in conditions of life; then the actual number of deaths from pneumonia, other than broncho, that would have occurred in 1913 would have been 1,564, instead of 1,947, the number that was actually registered.

Why the males suffer more from this disease than do the females is difficult to determine. Occupations of the males undoubtedly play a large part in their excessive death rate, while the greater amount of intemperance among men has no inconsiderable influence in the same direction.

TABLE 6.—*The influence of sex in fatal cases of broncho and other forms of pneumonia, in Michigan, as indicated by the number of yearly deaths and the death rates per 100,000 population of each sex during the years, 1898-1913.*

Years.	Pneumonia.											
	Broncho.						Other forms.					
	Annual deaths.			Death rates per 100,000 population of each sex.			Annual deaths.			Death rates per 100,000 population of each sex.		
	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.
1898	242	127	115	10.3	10.3	9.9	1,805	992	813	76.8	80.7	70.1
1899	287	162	125	12.0	13.0	10.6	2,192	1,226	966	91.9	98.4	81.9
1900	353	186	167	14.6	14.9	14.2	2,035	1,089	946	84.1	87.2	80.7
1901	489	239	250	20.0	18.9	21.1	2,412	1,352	1,060	98.4	107.0	89.3
1902	502	283	219	20.3	22.2	18.2	2,135	1,189	946	86.2	93.3	78.7
1903	588	297	291	23.5	23.1	23.9	2,019	1,118	901	80.7	86.9	74.1
1904	545	270	275	21.5	20.8	22.3	2,101	1,164	937	83.0	91.2	76.1
1905	485	239	246	19.0	18.2	19.7	1,932	1,059	873	75.5	80.8	70.1
1906	540	287	253	20.9	21.7	20.1	2,081	1,194	887	80.5	90.2	70.3
1907	625	325	300	23.9	24.3	23.5	2,393	1,371	1,022	91.6	102.6	80.1
1908	485	256	229	18.4	19.0	17.7	1,828	1,036	792	69.3	76.8	61.4
1909	507	255	252	19.0	18.7	19.3	1,758	981	777	66.0	72.1	59.5
1910	741	382	359	26.4	26.3	26.5	2,044	1,196	848	72.7	82.2	62.6
1911	805	441	364	28.2	29.8	26.4	1,958	1,139	819	68.5	76.3	59.5
1912	939	508	431	32.3	33.7	30.9	1,857	1,086	771	64.0	72.1	55.2
1913	947	530	417	32.1	34.6	29.4	1,947	1,195	752	66.0	78.0	53.0
Annual average	568	299	268	21.7	22.3	21.2	2,031	1,149	882	77.8	85.5	69.6

DIAGRAM SHOWING THE DEATH RATES FROM BRONCHO AND OTHER FORMS OF PNEUMONIA PER 100,000 POPULATION OF EACH SEX, IN MICHIGAN, DURING THE YEARS, 1898-1913.



RESTRICTIVE AND PREVENTIVE MEASURES IN PNEUMONIA.

As previously stated, there is a large number of non-fatal cases of pneumonia, occurring in this State, that are not reported by the attending physicians to the local health officer, therefore, making it impossible for the local health officials to enforce the preventive measures in these non-fatal cases.

While this Board recommends that all persons sick with pneumonia must be isolated from all persons except the attendants, still it is believed that, if the sputa and other discharges from the respiratory tract of the patient, together with the clothing and other articles contaminated by these discharges, are properly disinfected, little danger of the spread of the disease to others may be feared.

There is now no question of the communicability of pneumonia, nor can any doubt exist, in the minds of fair-minded physicians, as to the efficacy of the preventive measures, enumerated in the above paragraph, in preventing the spread of this disease to others. Therefore, it would seem that physicians, if they are interested in reducing the prevalence of pneumonia, would see the necessity of reporting all of their cases to the local health officer, so that these preventive measures could be properly enforced.

By Table 7 it will be seen that, in 1913, the restrictive measures were enforced in a much higher per cent of the cases than in former years.

TABLE 7.—*Restrictive and preventive measures in pneumonia, in Michigan, in 1913 and the average for the years, 1904-1912.*

Restrictive and preventive measures.	1913.		Average, 1904-1912.	
	Cases.	Per cent.	Cases.	Per cent.
ISOLATION:				
Enforced	2,529	68	1,414	41
Neglected	373	10	636	18
Not stated or statements doubtful	831	22	1,440	41
DISINFECTION OF SPUTA:				
Enforced	2,751	*74	1,665	*49
Neglected	126	*4	267	*8
Not stated or statements doubtful	826	*22	1,481	*43
DISINFECTION OF BEDDING, CLOTHING, ETC., SOILED BY SPUTA:				
Enforced	2,818	*76	2,043	*60
Neglected	78	*2	248	*7
Not stated or statements doubtful	807	*22	1,122	*33
DISINFECTION OF ROOMS OCCUPIED BY PATIENTS:				
Enforced	2,854	76	2,039	58
Neglected	90	2	375	11
Not stated or statements doubtful	789	22	1,076	31

*During the years 1904-1912, there were on the average of 77 instances per year in which there was said to be no sputa, and in 1913, 30 instances, therefore these numbers have been deducted from the total number of cases before making the per cents.

TUBERCULOSIS IN MICHIGAN IN 1913 AND PRECEDING YEARS

GENERAL PREVALENCE.

That the provisions of the law, providing that all cases of tuberculosis coming to the notice of a physician shall forthwith be reported by that physician to the local health officer, is not being fully observed is shown by the figures contained in the following table:

Year.	Deaths reported.	Living cases reported.
1911	2,766	1,805
1912	2,744	1,958
1913	2,693	1,920

The above-mentioned law became operative in the year 1909, but according to the above figures, after two years of the law's existence (which seem ample time for physicians to have become familiar with its provisions) the number of deaths greatly exceeded the number of reported living cases, and even as late as 1913 this condition is not much improved. The reporting of such a small number of living cases, compared with the number of deaths, indicates that only those cases in their terminal stages are being reported.

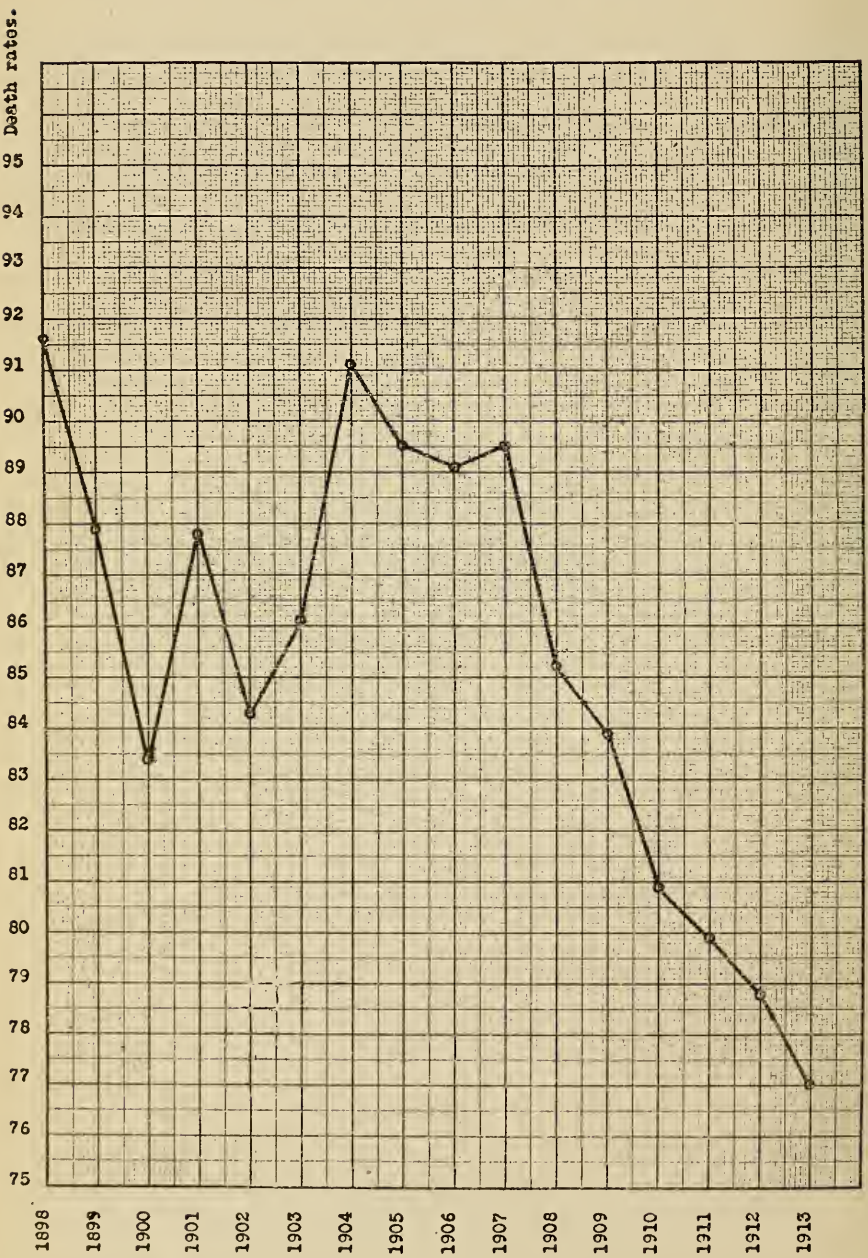
There is one extremely interesting fact, however, contained in the above table, and that is the diminution in the number of deaths (notwithstanding the increase in the population) from 2,766 deaths in 1911 to 2,693 in 1913, or a drop of nearly 3 per cent in the actual number of deaths. The death rate, which allows for the increase of the population, shows a decrease of 6 per cent in 1913 over that of 1911.

In Table 8 are shown the deaths and death rates from pulmonary and other forms of tuberculosis for each of the years, 1898-1913, and the death rates from pulmonary tuberculosis are graphically represented in the diagram following the table.

TABLE 8.—*The prevalence of tuberculosis, in Michigan, in each of the sixteen years, 1898-1913.*

Years.	Pulmonary.		Other forms.	
	Deaths.	Deaths per 100,000 population.	Deaths.	Deaths per 100,000 population.
1898	2,153	91.6	673	28.6
1899	2,098	87.9	596	25.0
1900	2,018	83.4	460	19.0
1901	2,152	87.8	380	15.5
1902	2,088	84.3	357	14.4
Average, 1898-1902	2,102	86.9	493	22.9
1903	2,155	86.1	393	15.7
1904	2,306	91.1	441	17.4
1905	2,288	89.5	437	17.1
1906	2,303	89.1	422	16.3
1907	2,338	89.5	383	14.7
Average, 1903-1907	2,278	89.1	415	16.2
1908	2,249	85.2	451	17.1
1909	2,237	83.9	387	14.5
1910	2,273	80.9	483	17.2
1911	2,284	79.9	482	16.9
1912	2,289	78.8	455	15.7
Average, 1908-1912	2,266	81.7	452	16.3
1913	2,273	77.0	420	14.2

DIAGRAM SHOWING THE DEATH RATES FROM PULMONARY TUBERCULOSIS PER 100,000 POPULATION, IN MICHIGAN, DURING THE YEARS. 1898-1913.



THE GEOGRAPHICAL DISTRIBUTION OF TUBERCULOSIS.

The distribution of tuberculosis by geographical sections is shown in Table 9.

As indicated by the death rates per 100,000 of population, this disease is most prevalent, on the average, in the Upper Peninsular group of counties and least prevalent in the Northern group. The Upper Peninsular group still holds its unenviable position in 1913, that group having the highest death rate from this disease in that year, while the Central group of counties has the lowest rate in 1913, which record is held, on the average, by the Northern group.

The death rates in 1913, compared with the average death rates of the same group, shows a decrease in each geographical division. This decrease, expressed in per cent, is noted in the following table:

Divisions.	Per cent of decrease in rate from—	
	Pulmonary tuberculosis.	Tuberculosis (other forms).
STATE	10	19
Upper Peninsular counties	12	20
Northern counties	12	33
Central counties	19	18
Southern counties	8	17

Of the Upper Peninsular Division, the counties having unusually high average death rates are: Houghton, Luce, Mackinac and Marquette. In the Northern group, Grand Traverse county has a high average rate; none of the counties of the Central section seem to have an excessive rate, while in the Southern group of counties Kalamazoo, Kent and Wayne are comparatively high. The high death rates in the counties of Luce, Grand Traverse and Kalamazoo are due almost solely to the excessive number of deaths occurring in the Hospitals for the Insane, which are located in these counties. It will also be noted that the death rates for 1913, in these counties, showed a decided increase, as compared with their average rates.

TABLE 9.—*Showing the deaths and death rates per 100,000 population from tuberculosis in the State of Michigan and in each of the counties thereof in 1913, also the average annual number of deaths and the rates per 100,000 population for the years, 1898-1912, inclusive.*

State and counties by geographical sections.	1913.						Average, 1898-1912.					
	Deaths.			Death rates per 100,000 population.			Deaths.			Death rates per 100,000 population.		
	Total.	Pulmonary.	Other forms.	Total.	Pulmonary.	Other forms.	Total.	Pulmonary.	Other forms.	Total.	Pulmonary.	Other forms.
STATE OF MICHIGAN	**2,693**	**2,273**	**420**	**91.3**	**77.0**	**14.2**	**2,668**	**2,215**	**453**	**103.1**	**85.6**	**17.5**
I.—Upper Peninsula	**344**	**280**	**64**	**98 1**	**79.8**	**18.2**	**301**	**237**	**64**	**113.0**	**90.3**	**22.7**
Alger	5	4	1	60.6	48.5	12.1	5	4	1	69.9	54.0	16.0
Baraga	8	7	1	120.5	105.4	15.1	5.7	5	.7	106.1	93.8	12.2
Chippewa	30	23	7	117.0	89.7	27.3	24	20	4	107.5	91.1	16.4
Delta	30	27	3	94.8	85.3	9.5	31	26	5	111.7	93.1	18.6
Dickinson	21	18	3	98.5	84.4	14.1	20	15	5	104.9	79.5	25.3
Gogebic	24	20	4	91.1	75.9	15.2	19	16	3	101.8	84.1	17.7
Houghton	96	73	23	99.1	75.4	23.8	96	73	23	131.0	99.7	31.3
Iron	15	8	7	82.0	43.8	38.3	8	6	2	73.4	56.5	16.9
Keweenaw	7	7	0	82.7	82.7	.....	4.8	4	.8	105.3	89.3	16.0
Luce	11	11	0	270.6	270.6	.....	5.8	5	.8	157.6	136.3	21.2
Mackinac	9	9	0	92.3	92.3	.....	11	10	1	139.9	122.1	17.7
Marquette	55	45	10	109.8	89.8	20.0	34	23	11	128.8	102.8	26.0
Menominee	20	18	2	79.2	71.3	7.9	23	18	5	90.9	70.4	20.5
Ontonagon	3	1	2	31.9	10.6	21.3	6.7	6	.7	85.5	75.7	9.8
Schoolcraft	10	9	1	114.9	103.4	11.5	7	6	1	78.2	64.4	13.8
II.—Northern Counties	**254**	**224**	**30**	**76.5**	**67.5**	**9.0**	**291.1**	**249**	**42.1**	**90.7**	**77.2**	**13.4**
Alcona	4	4	0	70.0	70.0	.....	5.9	5	.9	87.3	71.9	15.3
Alpena	13	11	2	64.8	54.8	10.0	18	15	3	90.8	77.1	13.7
Antrim	5	5	0	31.8	31.8	.....	13	10	3	86.7	67.7	19.0
Arenac	8	7	1	85.4	74.7	10.7	5.9	5	.9	63.0	53.5	9.5
Benzie	7	6	1	66.3	56.8	9.5	12	10	2	110.6	91.1	19.6
Charlevoix	19	16	3	92.3	77.7	14.6	16	14	2	97.3	82.9	14.4
Cheboygan	14	14	0	77.0	77.0	.....	14	12	2	80.1	70.9	9.2
Clare	3	3	0	32.4	32.4	.....	5.9	5	.9	66.2	56.7	9.5
Crawford	3	3	0	75.5	75.5	.....	2.3	2	.3	62.2	53.3	8.9
Emmet	20	18	2	105.8	95.3	10.6	19	16	3	106.5	90.9	15.6
Gladwin	3	3	0	36.1	36.1	.....	4.8	4	.8	60.0	50.4	9.6

Grand Traverse	44	41	3	182.8	170.3	12.5	34	30	4	146.0	127.2	18.8
Iosco	4	4	0	42.7	42.7	.....	10	8	2	94.2	75.2	19.0
Kalkaska	3	2	1	36.0	24.0	12.0	7	6	1	90.7	74.8	15.8
Lake	4	3	1	81.5	61.1	20.4	5.3	5	.3	97.0	90.4	6.6
Leelanau	9	8	1	85.7	76.2	9.5	13	12	1	119.9	107.6	12.3
Manistee	29	24	5	109.7	90.8	18.9	29	25	4	107.1	91.1	16.0
Mason	15	14	1	65.4	61.0	4.4	20	17	3	102.0	85.2	16.7
Missaukee	4	3	1	37.1	27.8	9.3	6	5	1	61.0	51.3	9.7
Montmorency	4	4	0	103.2	103.2	.....	3.3	3	.3	87.2	79.8	7.4
Ogemaw	6	4	2	68.2	45.5	22.7	5.7	5	.7	61.1	52.7	8.4
Osceola	16	14	2	91.3	79.9	11.4	14	12	2	75.6	63.4	12.2
Oscoda	0	0	0	.....	.....	.....	1.1	1	.1	58.7	51.8	6.9
Otsego	2	1	1	32.2	16.1	16.1	3.3	3	.3	51.1	46.2	4.8
Presque Isle	8	7	1	69.9	61.2	8.7	5.6	5	.6	54.4	48.8	5.6
Roscommon	0	0	0	.....	.....	.....	2	2	0	97.0	97.0	.....
Wexford	7	5	2	32.5	23.2	9.3	15	12	3	76.6	63.6	13.0
III.—Central Counties	**341**	**282**	**59**	**74.2**	**61.4**	**12.8**	**414**	**344**	**70**	**91.8**	**76.2**	**15.6**
Bay	71	60	11	100.5	84.9	15.6	62	53	9	95.3	81.1	14.2
Gratiot	13	13	0	46.5	46.5	.....	29	24	5	98.3	81.4	16.9
Huron	24	19	5	69.2	54.8	14.4	29	25	4	83.4	70.9	12.5
Isabella	17	11	6	75.6	48.9	26.7	22	18	4	93.3	76.6	16.7
Mecosta	13	11	2	68.1	57.6	10.5	19	15	4	91.3	72.9	18.5
Midland	10	8	2	73.0	58.4	14.6	13	11	2	88.0	71.7	16.3
Montcalm	24	21	3	76.3	66.7	9.5	29	25	4	88.3	74.9	13.4
Muskegon	38	32	6	90.1	75.9	14.2	42	35	7	109.9	92.0	17.8
Newaygo	10	10	0	51.0	51.0	.....	15	12	3	78.4	63.9	14.4
Oceana	11	9	2	58.8	48.1	10.7	15	13	2	88.0	75.3	12.7
Saginaw	72	58	14	79.0	63.7	15.4	81	66	15	93.6	76.5	17.1
Sanilac	13	10	3	38.9	29.9	9.0	27	22	5	82.6	68.4	14.2
Tuscola	25	20	5	72.7	58.2	14.5	31	25	6	87.0	70.4	16.6
IV.—Southern Counties	**1,754**	**1,487**	**267**	**97.3**	**82.5**	**14.8**	**1,642**	**1,364**	**278**	**107.1**	**89.3**	**17.9**
Allegan	30	28	2	74.5	69.6	5.0	37	30	7	94.3	77.5	16.8
Barry	12	10	2	52.3	43.6	8.7	17	14	3	73.7	62.1	11.6
Berrien	40	34	6	71.7	61.0	10.8	53	42	11	105.1	83.9	21.2
Branch	14	11	3	55.5	43.6	11.9	23	19	4	89.8	74.4	15.4
Calhoun	47	38	9	80.4	65.0	15.4	51	42	9	93.8	77.9	15.9
Cass	14	11	3	66.9	52.6	14.3	21	17	4	105.2	85.5	19.7
Clinton	12	10	2	54.3	45.3	9.1	20	17	3	80.8	69.3	11.5
Eaton	17	12	5	55.9	39.5	16.4	31	26	5	98.3	83.0	15.3
Genesee	56	46	10	74.2	61.0	13.3	43	36	7	90.4	75.3	15.1
Hillsdale	16	13	3	54.1	43.9	10.1	27	23	4	90.2	77.0	13.2
Ingham	38	31	7	65.3	53.3	12.0	36	29	7	78.8	63.7	15.1
Ionia	20	17	3	60.6	51.5	9.1	34	28	6	97.9	82.0	15.9
Jackson	41	39	2	72.5	68.9	3.5	44	37	7	90.6	75.5	15.1
Kalamazoo	87	77	10	132.3	117.1	15.2	61	51	10	115.6	97.0	18.6
Kent	154	128	26	92.0	76.4	15.5	169	136	33	117.2	94.4	22.8
Lapeer	24	21	3	94.0	82.3	11.8	22	18	4	84.6	68.3	16.3
Lenawee	20	18	2	42.3	38.0	4.2	45	36	9	91.2	73.6	17.6

TABLE 9.—*Concluded.*

Counties by geographical sections.	1913.						Average, 1898-1912.					
	Deaths.			Death rates per 100,000 population.			Deaths.			Death rates per 100,000 population.		
	Total.	Pulmonary.	Other forms.	Total.	Pulmonary.	Other forms.	Total.	Pulmonary.	Other forms.	Total.	Pulmonary.	Other forms.
IV.—Southern Counties.—Continued.												
*Livingston	25	22	3	144.7	127.3	17.4	19	16	3	102.9	88.9	14.0
Macomb	25	18	7	77.2	55.6	21.6	35	29	6	106.8	89.2	17.6
Monroe	26	21	5	79.0	63.8	15.2	34	28	6	102.9	85.6	17.3
Oakland	48	43	5	93.2	83.5	9.7	48	41	7	102.7	87.3	15.5
Ottawa	39	31	8	83.2	66.2	17.1	40	33	7	92.4	77.3	15.1
St. Clair	42	36	6	82.9	71.0	11.8	48	38	10	87.6	69.8	17.8
St. Joseph	18	13	5	67.6	48.9	18.8	23	20	3	96.2	81.7	14.5
Shiawassee	23	17	6	69.7	51.5	18.2	31	27	4	91.8	80.4	11.5
Van Buren	14	12	2	43.4	37.2	6.2	30	25	5	88.6	72.8	15.8
Washtenaw	51	35	16	116.8	80.1	36.6	53	41	12	114.9	88.6	26.2
Wayne	801	695	106	132.6	115.1	17.6	547	465	82	131.4	111.6	19.8

*State Tuberculosis Sanatorium located in this county.

THE PREVALENCE OF TUBERCULOSIS IN CERTAIN CITIES OF MICHIGAN.

By reference to Table 10 it may be seen that tuberculosis of all forms, is most prevalent in the group of cities of from 10,000 to 25,000 inhabitants and least prevalent in the group having from 25,000 to 50,000.

The pulmonary tuberculosis death rates of 1913, compared with the average rates of preceding years, show a decrease in each of the groups. In the group of cities of 50,000 inhabitants and over the death rate for 1913 decreased 15 per cent; 5 per cent in the group of from 25,000 to 50,000 population, and 7 per cent in the group of from 10,000 to 25,000 inhabitants.

The death rates from other forms of tuberculosis in 1913, compared with the average rates, shows a decrease of 15 per cent in the largest cities and 21 per cent in the group of from 25,000 to 50,000 population, while the group having from 10,000 to 25,000 population shows an increase of practically 7 per cent.

The individual cities in which unusually high death rates from pulmonary tuberculosis were recorded in 1913, are: Kalamazoo (151.4), Pontiac (152.8), and Traverse City (278.8). The high death rates in these cities are due entirely to the large number of deaths from this disease occurring in the hospitals for the insane, which are located in these cities. The footnote to Table 10 contains the death rates for these cities that would have been registered had the deaths that occurred in these hospitals been deducted from the total deaths from pulmonary tuberculosis occurring in these cities.

TABLE 10.—*The deaths and death rates per 100,000 population from pulmonary and other forms of tuberculosis in 1913, also the average for the years, 1904-1912, in cities of Michigan of 10,000 inhabitants and over.*

Cities.	1913.				Average, 1904-1912.			
	Pulmonary.		Other forms.		Pulmonary.		Other forms.	
	Deaths.	Deaths per 100,000 inhabitants.	Deaths.	Deaths per 100,000 inhabitants.	Deaths.	Deaths per 100,000 inhabitants.	Deaths.	Deaths per 100,000 inhabitants.
CITIES OVER 50,000 INHABITANTS	616	86.4	123	17.2	557	101.7	104	19.0
Detroit	513	95.0	91	16 9	418	106.6	71	18.1
Grand Rapids	66	54.5	22	18.2	95	89.9	24	22.7
Saginaw	37	70.5	10	19.1	44	88.2	9	18.0
CITIES FROM 25,000 TO 50,000 INHABITANTS	229	86.2	33	12.4	186	90.5	32	15.6
Battle Creek	17	63.4	5	18.7	22	88.3	5	20.1
Bay City	43	90.7	7	14.8	33	80 7	5	12.2
Flint	29	57.6	3	6.0	20	80.5	3	12.1
Jackson	29	84.1	2	5.8	27	97.3	4	14.4
Kalamazoo	67	*151.4	7	15.8	43	120.2	7	19.6
Lansing	21	57.2	6	16.3	16	55.0	4	13.7
Muskegon	23	87.7	3	11.3	25	112.8	4	18.0
CITIES FROM 10,000 TO 25,000 INHABITANTS	176	100.8	42	24.0	179	108.9	37	22.5
Adrian	5	46.3	0	.....	†8	67.4	2	17.8
Alpena	7	54.4	2	15.6	†12	94.1	2	15.7
Ann Arbor	14	93.8	11	73.7	16	108.8	7	47.9
Escanaba	16	112.3	2	14.0	15	119.4	3	23.9
Ironwood	8	56.3	2	14.1	8	71.2	2	17.8
Ishpeming	6	46.6	1	7.8	12	106.5	3	26.6
Manistee	15	122.8	5	40.9	†14	119.0	2	17.0
Marquette	7	58.7	5	41.9	13	115.6	3	26.7
Menominee	8	78.3	1	9.8	8	78.8	3	29.6
Pontiac	25	*152.8	2	12.2	19	148.8	2	15.7
Port Huron	14	76.6	5	27.4	14	69.8	2	10.0
Sault Ste. Marie	16	121.1	4	30.3	13	105.9	3	24.4
Traverse City	35	*278.8	2	15.9	27	218.9	3	24.3

*After deducting the deaths from tuberculosis that occurred in the hospitals for the insane, the rate for pulmonary tuberculosis in Kalamazoo city, in 1913, was 83.2, while the rate for other forms is unchanged; in Pontiac, the rate for pulmonary tuberculosis is 58.6 and other forms remain unchanged, and in Traverse City the rate for pulmonary tuberculosis is 60.6 and no deaths from other forms of tuberculosis.

†Average, 1906-1912.

THE PREVALENCE OF PULMONARY TUBERCULOSIS IN URBAN AND RURAL LOCALITIES.

The sanitary conditions of rural life are only partly reflected in the crude death rates of the rural localities, such as are shown in Table 11.

It is a generally accepted fact in public health discussions that the general conditions of rural territory are conducive to a low death rate from tuberculosis. Conclusions of this kind are based chiefly upon a study of the crude death rate, which indicates a lower mortality from this disease than in urban districts. It is perhaps necessary to point out that the crude death rate may be more or less misleading on account of decided variations in the comparative distribution of the urban and rural populations, by sex, age, race, nativity and occupations, each of which are vitally important factors on the prevalence of tuberculosis. A thorough statistical inquiry into the subject, however, is most difficult on account of the fact that the elements of the population of each of the counties and their subdivisions are not made fully available by the census reports, therefore, this discussion is limited to the crude death rates shown in Table 11.

It will be observed by this table that pulmonary tuberculosis is much more prevalent in cities than in rural districts. In part, this may be due to the differences in the age distribution of the populations, as the percentage of persons whose ages range from 20-40 years, among whom tuberculosis reaches its highest prevalency, is much higher in the cities. Occupation also plays no inconsiderable part in the excessive rate of the cities, as there are more health-injurious occupations engaged in in the cities than in the rural localities. As will be noted, however, there is a downward tendency in the death rates of both the urban and rural localities.

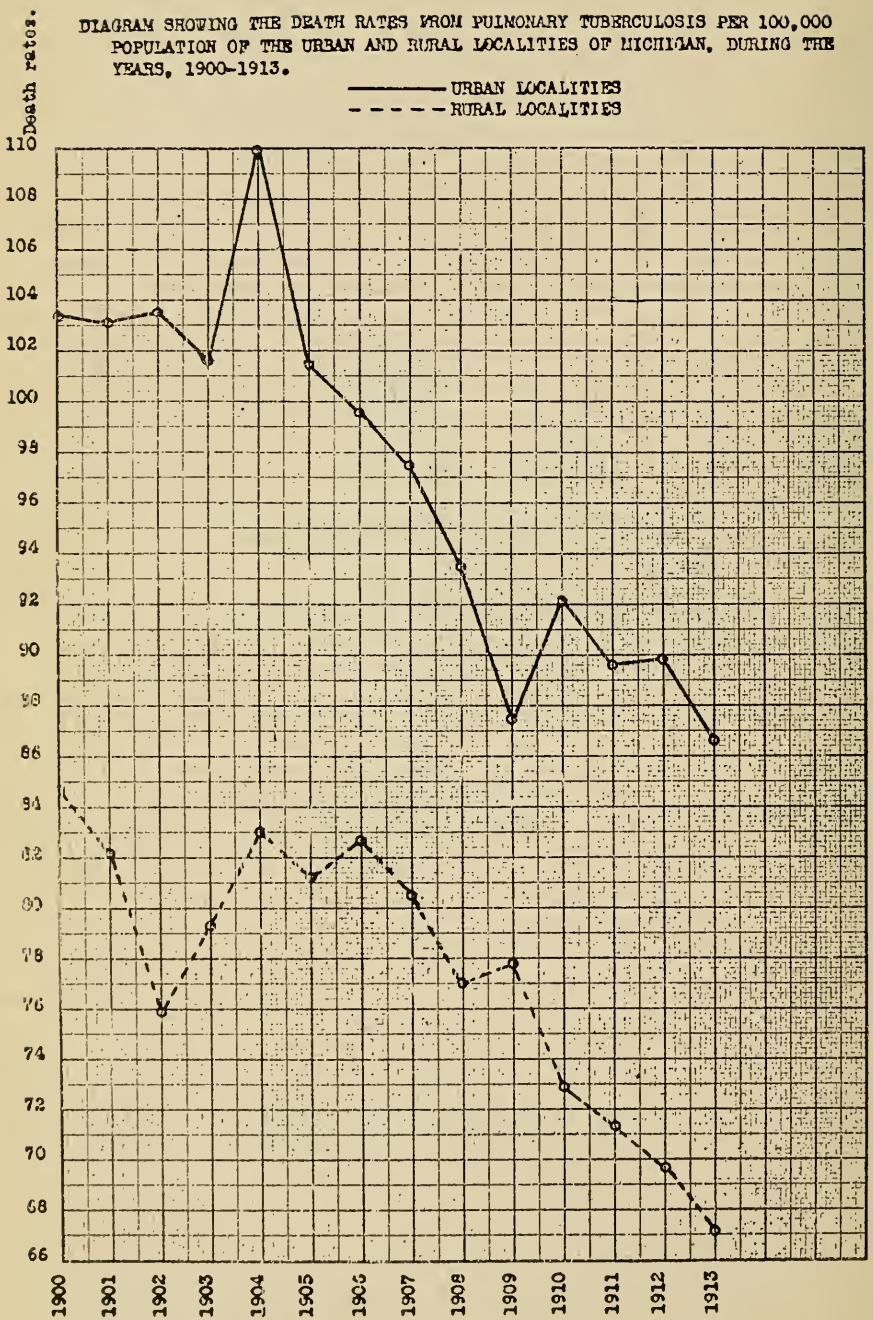
The minimum tuberculosis death rate for the cities occurred in 1913, when it was 86.6 per 100,000 of its population; and the maximum rate was recorded in 1904, when it was 110.1. The minimum rate for the rural localities also occurred in 1913, when it was 67.1; and the maximum rate occurred in 1900, when it was 84.7. The difference in the two rates of the cities represents a decrease of 23.5 deaths per each 100,000 of population, while the difference in the two rates of the rural localities represent a decrease of 20.6 deaths per each 100,000 of their population. The excess in the urban over the rural death rate is not so pronounced in recent years as formerly. For instance, in 1904, when the urban rate reached its maximum, and the rural rate for that year practically equaled its maximum rate, the urban rate represented an excess of 27.1 deaths per each 100,000 of its population, over the rate of the rural localities, while in 1913 this excess amounted to only 19.5 deaths.

TABLE 11.—*The death rates per 100,000 population from pulmonary tuberculosis in the urban and rural localities, of Michigan, during each of the years, 1900-1913.*

Years.	Death rates per 100,000 population in—	
	Urban.	Rural.
1900	103.4	84.7
1901	103.1	82.2
1902	103.5	75.9
1903	101.6	78.3
1904	110.1	83.0
1905	101.4	81.2
1906	99.6	82.7
1907	97.5	80.5
1908	93.5	76.0
1909	87.5	76.8
1910	92.1	72.9
1911	89.6	71.3
1912	89.8	69.7
1913	86.6	67.1

NOTE.—The term "Urban" as here used is restricted to municipalities having 10,000 or more inhabitants in 1910; smaller places being included with the "Rural districts."

DIAGRAM SHOWING THE DEATH RATES FROM PULMONARY TUBERCULOSIS PER 100,000 POPULATION OF THE URBAN AND RURAL LOCALITIES OF MICHIGAN, DURING THE YEARS, 1900-1913.



INFLUENCE OF SEASONS ON THE MORTALITY FROM TUBERCULOSIS.

In Table 12 may be seen the average number of monthly deaths from pulmonary and other forms of tuberculosis.

The largest number of deaths from pulmonary tuberculosis occurs during months of from January to May, inclusive, while the deaths from other forms of tuberculosis reaches its maximum during the months of from February to July, inclusive. This statement is based on the figures in the column captioned "Monthly deaths reduced to a standard of 100," in Table 12, the method of obtaining same being explained in a preceding page.

TABLE 12.—*The seasonal fatality from pulmonary and other forms of tuberculosis, in Michigan, as shown by the average number of deaths from these diseases in each month in the sixteen years, 1898-1913.*

Month.	Pulmonary tuberculosis.		Other forms of tuberculosis.	
	Average number of deaths occurring in each month during the years 1898-1913.	Monthly deaths reduced to a standard of 100.	Average number of deaths occurring in each month during the years 1898-1913.	Monthly deaths reduced to a standard of 100.
January	193	102.7	35	92.1
February	198	116.5	37	107.9
March	221	117.6	47	123.7
April	220	120.7	42	113.2
May	217	115.4	43	113.2
June	180	97.3	38	102.6
July	171	91.0	38	100.0
August	164	87.2	37	97.4
September	156	85.6	37	100.0
October	167	88.8	33	86.8
November	160	87.0	32	86.8
December	173	92.0	32	84.2
Annual average	2,220	100.0	451	100.0

AGE DISTRIBUTION OF TUBERCULOSIS.

As previously stated, the age distribution of populations is a most important factor to be considered in comparing the mortality rates from tuberculosis, which fact is borne out by the variations in the death rates of the several age groups shown in Table 13, and which is graphically represented in the diagram following.

Under one year of age the death rate was 40.4 per 100,000 of the persons living at that age, when the rate decreases with the advancement of age until the age group of from 5-9 years is reached, at which ages the lowest death rate is recorded (6.2 per 100,000 living at that age). Beginning with the tenth year of age, the rate again increases with the advancement of age, up to the age group of 20-29 years, at which age the rate reaches the maximum (154.4). Beginning with the 30th year of age, the rate again decreases up to the 60th year of age when another increase is noted up to the eightieth year.

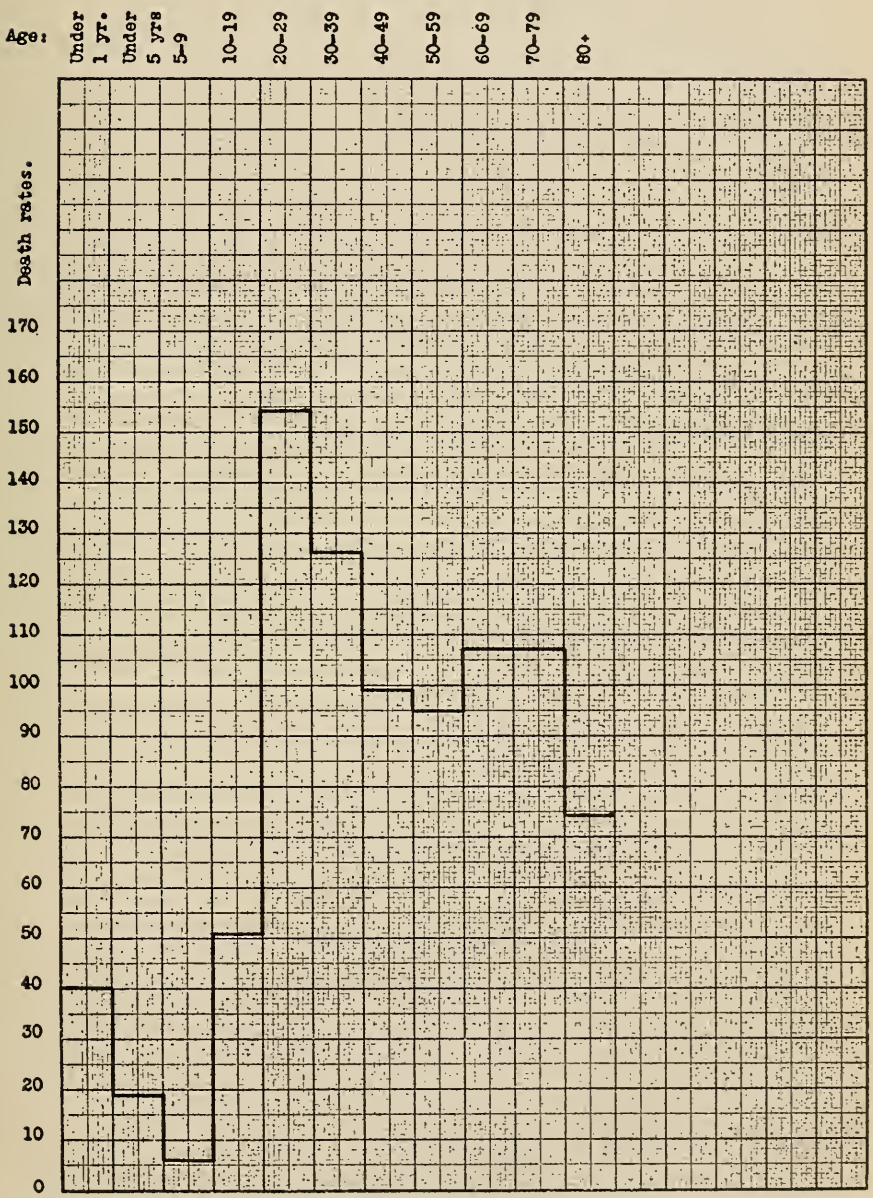
The death rate from other forms of tuberculosis reaches its maximum at the first year of life, when it gradually decreases until at the ages of from 5-9 years the rate reaches its minimum. After this age the rate fluctuates considerably, but with an increasing tendency.

TABLE 13.—*The influence of age in fatal cases of pulmonary and other forms of tuberculosis, in Michigan, as indicated by the average number of annual deaths occurring from this disease at each age group and the death rates per 100,000 population of the same age, during the years, 1898-1913, inclusive.*

Age groups.	Tuberculosis.			
	Pulmonary.		Other forms.	
	Average annual number of deaths during the years, 1898-1913.	Death rates per 100,000 population of same age.	Average annual number of deaths during the years, 1898-1913.	Death rates per 100,000 population of same age.
ALL AGES	2,219	85.0	451	17.3
Under 1 year	24	40.4	42	70.2
Under 5 years	53	18.9	98	34.9
5-9 years	17	6.2	29	10.6
10-19 years	259	50.6	56	11.0
20-29 years	706	154.4	84	18.3
30-39 years	464	125.7	60	16.3
40-49 years	292	99.2	42	14.3
50-59 years	201	95.0	38	18.1
60-69 years	144	107.4	28	20.8
70-79 years	68	107.4	14	21.6
80 years and over	13	74.1	3	16.6
Unknown	3	.....	*	.....

*Less than one.

DIAGRAM SHOWING THE AVERAGE DEATH RATES FROM PULMONARY TUBERCULOSIS PER 100,000 OF POPULATION OF EACH AGE GROUP, IN MICHIGAN, DURING THE YEARS, 1898-1913.



SEX DISTRIBUTION OF TUBERCULOSIS.

By reference to Table 14, in which is shown the death rates from pulmonary and other forms of tuberculosis per 100,000 population of each sex, it becomes obvious that the sex also has a powerful influence on the death rate, especially in pulmonary tuberculosis.

As indicated by the death rates, shown in the above-mentioned table and in the diagram following the same, pulmonary tuberculosis was much more prevalent among the female population during the years, 1898-1911, as compared with the male population. Since 1911, however, this condition is reversed, the death rates of the males since that year exceeding those of the females.

The death rates of the females, beginning with the year 1898, fluctuated considerably, but with a downward trend, until the year 1904, after which year the death rates decline very rapidly with each succeeding year, the rate for each succeeding year always being lower than that of the year preceding. The death rates of the males, beginning with the year 1898, shows a downward trend until the year of 1904, when a sharp incline in the rate is noted, the rate reaching the maximum in 1905, after which year there is a slight gradual decline in the rates.

Although the death rates of the males have shown a downward tendency since 1905, they have fluctuated considerably from year to year, while the decline in the rates of the females has shown more consistency for the reason, as previously stated, the rate becomes less each succeeding year.

It will also be noted, by reference to Table 14, that the highest death rate recorded for the females occurred in the year 1898, when it was 102.6, and that the minimum rate occurred in 1913, when it was 72.2, which is a decrease of 30 per cent in the rate of 1913 compared with the rate of 1898.

This decided decline in the death rates from pulmonary tuberculosis among the females might be due to any one of several specific reasons, or to a combination of reasons. One reason that suggests itself as a cause of this reduction is improved sanitation. There is no doubt but that the sanitary conditions—ventilation, etc.,—of the average home, in which the female spends a greater share of her time than does the male, are much improved today when compared with the conditions that existed in the year 1898 and for a few years following. The school houses, also, in which more time is spent by the females, are comparatively more healthful than in former years, by the improved heating and ventilating systems that are now installed.

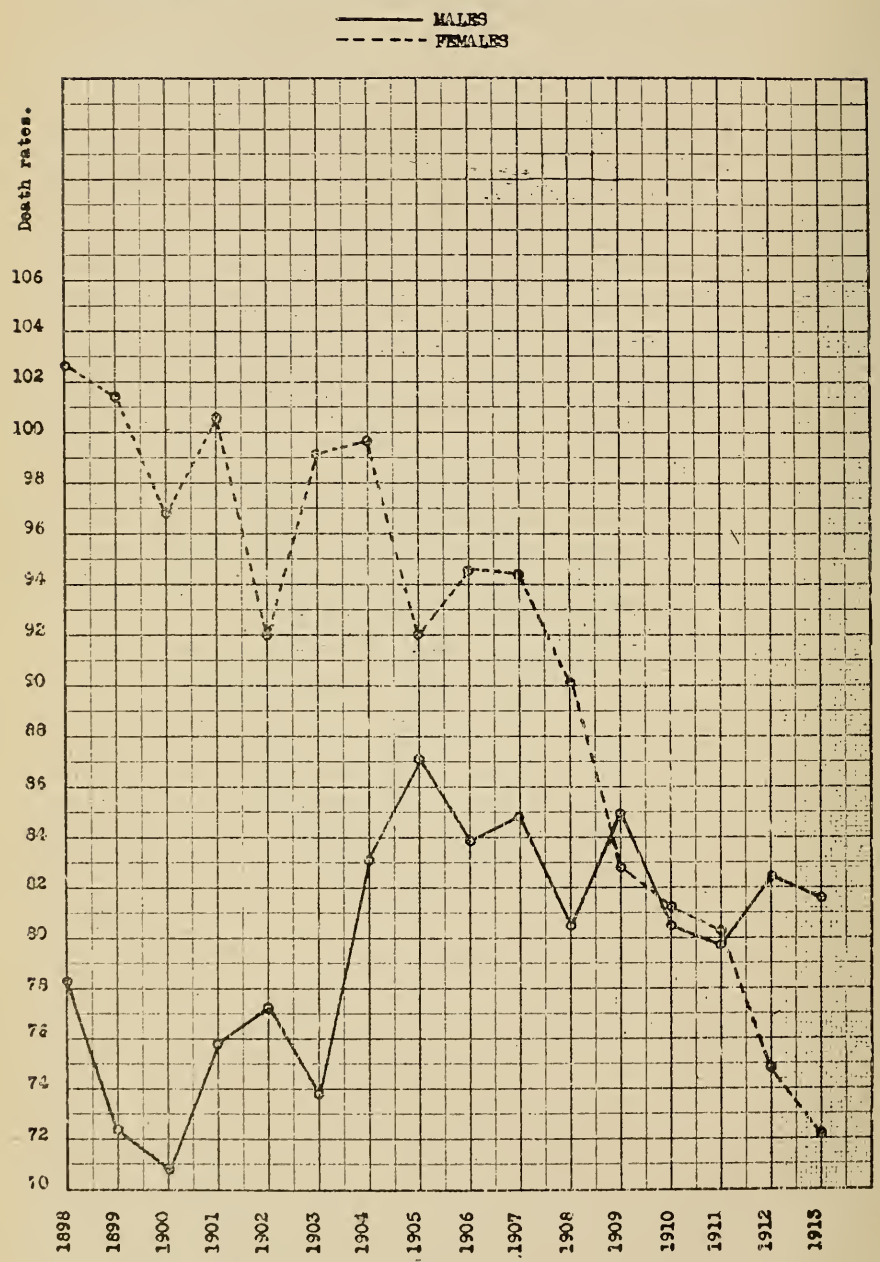
The foremost reason that suggests itself for the comparatively slight decline in the death rates of the males, is the fact that, since the year 1904, the per cent of males of the tubercular age (20-40) has greatly increased in the urban localities of this State, and this increase is at the expense of the rural districts, in which the natural conditions or surroundings are less conducive to a high death rate from this disease compared with the city life. Occupation also is a reason for the slight decline of the male rate compared with that of the female. These men who leave the rural districts for the city undoubtedly engage in more health-injurious occupations than they were formerly employed at in their rural home.

Sex in other forms of tuberculosis does not have the same influence as in pulmonary tuberculosis, as the death rates of the two sexes are practically uniform. While this form of the disease is on the decline, the decrease is practically identical with each sex.

TABLE 14.—*The influence of sex in fatal cases of pulmonary and other forms of tuberculosis, in Michigan, as indicated by the number of yearly deaths and the death rates per 100,000 population of each sex, during the years, 1898-1913.*

Years.	Tuberculosis.							
	Pulmonary.				Other forms.			
	Annual deaths.		Death rates per 100,000 population of each sex.		Annual deaths.		Death rates per 100,000 population of each sex.	
	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
1898	963	1,190	78.3	102.6	318	355	25.9	30.6
1899	902	1,196	72.4	101.4	320	276	25.7	23.4
1900	884	1,134	70.8	96.8	227	233	18.2	19.9
1901	958	1,194	75.8	100.6	198	182	15.7	15.3
1902	983	1,105	77.2	92.0	172	185	13.5	15.4
1903	949	1,206	73.8	99.1	199	194	15.5	15.9
1904	1,079	1,227	83.1	99.6	234	207	18.0	16.1
1905	1,142	1,146	87.1	92.0	207	230	15.8	18.5
1906	1,111	1,192	83.9	94.5	212	210	16.0	16.7
1907	1,133	1,205	84.8	94.4	194	189	14.5	14.8
1908	1,086	1,163	80.5	90.1	231	220	17.1	17.0
1909	1,156	1,081	84.9	82.8	202	185	14.8	14.2
1910	1,171	1,102	80.5	81.3	241	242	16.6	17.9
1911	1,180	1,104	79.7	80.2	244	238	16.5	17.3
1912	1,242	1,047	82.4	74.9	244	211	16.2	15.1
1913	1,250	1,023	81.6	72.2	218	202	14.2	14.2
Annual averages	1,074	1,145	79.9	90.3	229	222	17.0	17.6

DIAGRAM SHOWING THE DEATH RATES FROM PULMONARY TUBERCULOSIS PER 100,000 POPULATION OF EACH SEX, IN MICHIGAN, DURING THE YEARS, 1898-1913.



INFLUENCE OF RACE IN TUBERCULOSIS.

In Table 15 will be seen the proportionate population (expressed in per cent) that those of each color bore to the total population of Michigan, also the proportionate deaths from tuberculosis that those of each color bore to the total deaths from this disease.

As indicated by the figures in this table, the disease was more prevalent among the Negroes and Indians in proportion to their numbers than among the white population.

TABLE 15.—*The color of some of the tuberculous persons, in Michigan, reported during the nineteen years, 1895-1913.*

Color.	Number of instances in which the color was stated.	Per cent.	Approximate proportion of the total population of the State.—Expressed in per cents.
White	48,114	96.85	96.08
Black (Negro)	949	1.91	.64
Red (Indian)	613	1.23	.26
Yellow (Japanese and Chinese)	3	.01	.26

LOCATION OF THE DISEASE IN TUBERCULAR PERSONS.

The number of instances in which a statement was made as to the location of the disease in tubercular persons, who died during the years, 1895-1913, is contained in Table 16. It will be noted that the disease was located in the thoracic cavity in practically seven times as many instances as in all other parts of the body combined.

TABLE 16.—*Location of the disease in tuberculous persons, in Michigan, in the nineteen years, 1895-1913.*

Part of body.			Number of instances.
Cranial cavity (meninges and membranes)			559
Spine (vertebrae, cord and membranes)			212
Thoracic cavity	Pharynx	14	37,391
	Larynx	444	
	Bronchi	132	
	Lungs	36,473	
	Pleura	45	
	Instances in which the location of the disease was not specified	283	
Abdominal cavity	Stomach	229	2,864
	Liver	100	
	Kidneys	180	
	Spleen	9	
	Bladder	60	
	Intestines	1,617	
	Peritoneum	497	
	Instances in which the location of the disease was not specified	172	
Joints	Shoulder	3	271
	Elbow	8	
	Hip	159	
	Knee	69	
	Joints not specified	32	
Instances in which the disease was located in the tissues or other parts of the body but not definitely specified			1,292

RESTRICTIVE AND PREVENTIVE MEASURES IN TUBERCULOSIS.

Table 17 shows the number and per cent of instances in which the restrictive and preventive measures, as recommended by this Board, were enforced.

The disinfection of the sputa, the most important restrictive measure in the prevention of this disease, was carried out in only 66 per cent of the fatal cases, which per cent is less than the average for preceding years. The disinfection of the soiled bedding, clothing, etc., and the rooms occupied by the patients, in 1913, shows a slight improvement over former years.

TABLE 17.—*Restrictive and preventive measures in tuberculosis, in Michigan, in 1912 and 1913.*

Restrictive and preventive measures.	1913.		1912.	
	Number of instances.	Per cent.	Number of instances.	Per cent.
DISINFECTION OF SPUTA:				
Enforced	1,568	*66	1,506	*67
Neglected	54	*2	37	*3
Not stated or statements doubtful	705	*32	759	*30
DISINFECTION OF SOILED BEDDING, CLOTHING, ETC.:				
Enforced	1,771	69	1,757	65
Neglected	43	2	33	1
Not stated or statements doubtful	749	29	903	34
DISINFECTION OF DISCHARGES FROM BOWELS AND BLADDER:				
Enforced	69	61	86	†63
Neglected	4	4	5	†4
Not stated or statements doubtful	41	36	46	†33
DISINFECTION OF ROOMS OCCUPIED BY PATIENTS:				
Enforced	1,818	71	1,787	66
Neglected	23	1	19	1
Not stated or statements doubtful	722	28	887	33

*In 1913 disinfection of the sputa was not considered necessary in 236 instances, and in 1912, 291 instances, in which there was said to be no sputa, or in which the disease was said to be located only in the bowels, stomach, liver, etc.; therefore this number has been deducted from the total number of instances before making the per cent.

†Disinfection of the bowel and bladder discharges was considered necessary in but 114 instances in 1913 and 137 in 1912, i. e., where the disease was located solely, or in combination with some other organ, in the bowels, or in some other part of the body from which infection might leave the body by way of the bowels or bladder.

TYPHOID FEVER IN MICHIGAN IN 1913 AND PRECEDING YEARS.

GENERAL PREVALENCE.

As may be seen by reference to Table 18, and the diagram following the same, typhoid fever, as indicated by the death rates per 100,000 of population, is becoming less prevalent in this State each year, the death rate for the year 1913 being the lowest recorded in any year since 1898, when the law, providing for the compulsory reporting of all deaths, became operative, and, therefore, making the death rates prior to 1898 incomparable with those of subsequent years.

There is nothing in the series of annual reports, issued by this Board, that comes out more distinctly and unmistakably than the wonderful effect that the improved sanitary conditions and the improved water supplies have had on the saving of life, not alone from typhoid fever, but from all causes, as the rate from all causes generally fluctuates in sympathy with the typhoid death rate. If the converse of the Hazen theorem (that, when a community changes suddenly from a polluted to a pure water supply, for every life saved from typhoid fever three lives will be saved from death by other causes, not recognized as water-borne) be true, then the number of lives saved, by reason of these improvements, must be considerable.

Had the fall in the death rates, since 1900, been limited to a single year, or to even two or three years, it might have been argued by sceptical persons that the fall in the death rate was due to a succession of seasons favorable to a reduced prevalence of this disease, or to other causes unconnected to sanitary conditions; but in the face of the gradual downward trend, (even though the rates fluctuated), covering a period of thirteen years, no one can seriously maintain such a position. There can be no doubt that the saving effected in life from this disease was the direct product of the money and labor expended in general sanitary and water supply improvements. No doubt the money thus expended was enormous in amount; and it will be well, therefore, to consider what returns it has brought in.

In Michigan, the maximum death rate from typhoid fever was recorded in 1900, when it was 35.9 per 100,000 of population; and the minimum rate, as previously stated, occurred in 1913, when it was 18.3. This difference represents a reduction of 49 per cent in the minimum death rate over that of the maximum. If then, had the death rate of 1913 been equal to the rate of 1900, there would have died from typhoid fever, in this State, in the course of the year 1913, 520 persons, who, as it was, survived. It is probably well within the limit to assume that for every fatal case of illness from typhoid fever there are ten more cases which end in recovery. The result, therefore, on this assumption, would be that there were 5,200 fewer cases and 520 fewer deaths from typhoid fever in 1913 than would have been the case had the population been living under the same conditions that existed in 1900.

The above comparison, as a fair standard by which to measure the annual returns in life and health from the money spent in general sanitary and water supply improvements, may be objected to, and reasonably so, on the ground that the season or other conditions, foreign to sanitation, existing in 1913 might have been conducive to a very low death rate in that year, while the

conditions existing in 1900 might have been conducive to a very high rate. To remove the objections on these grounds, let us take the five-year period, 1898-1902, which includes the year of the highest rate, and the five-year period, 1909-1913, which includes the year of the lowest rate, for comparison, as by this comparison, any abnormal condition that might have existed in any one year, tending to raise or lower the typhoid death rate, would be equalized by the more normal conditions existing in the other years.

Had the average death rate from typhoid fever in the latter five-year period been identical with that of the former, the total deaths that would have occurred from this disease in the course of the five years, 1909-1913, would have been 3,845, whereas, there were actually no more than 2,931. Thus no less than 914 persons who, under the conditions that existed during the years of from 1898-1902, inclusive, would have died, as a matter of fact were still living at the end of the year 1913. Add to these saved lives the avoidance of at least ten times as many attacks of non-fatal cases of typhoid fever, and we have the total profits received from the expenditure on sanitary and public water supply improvements.

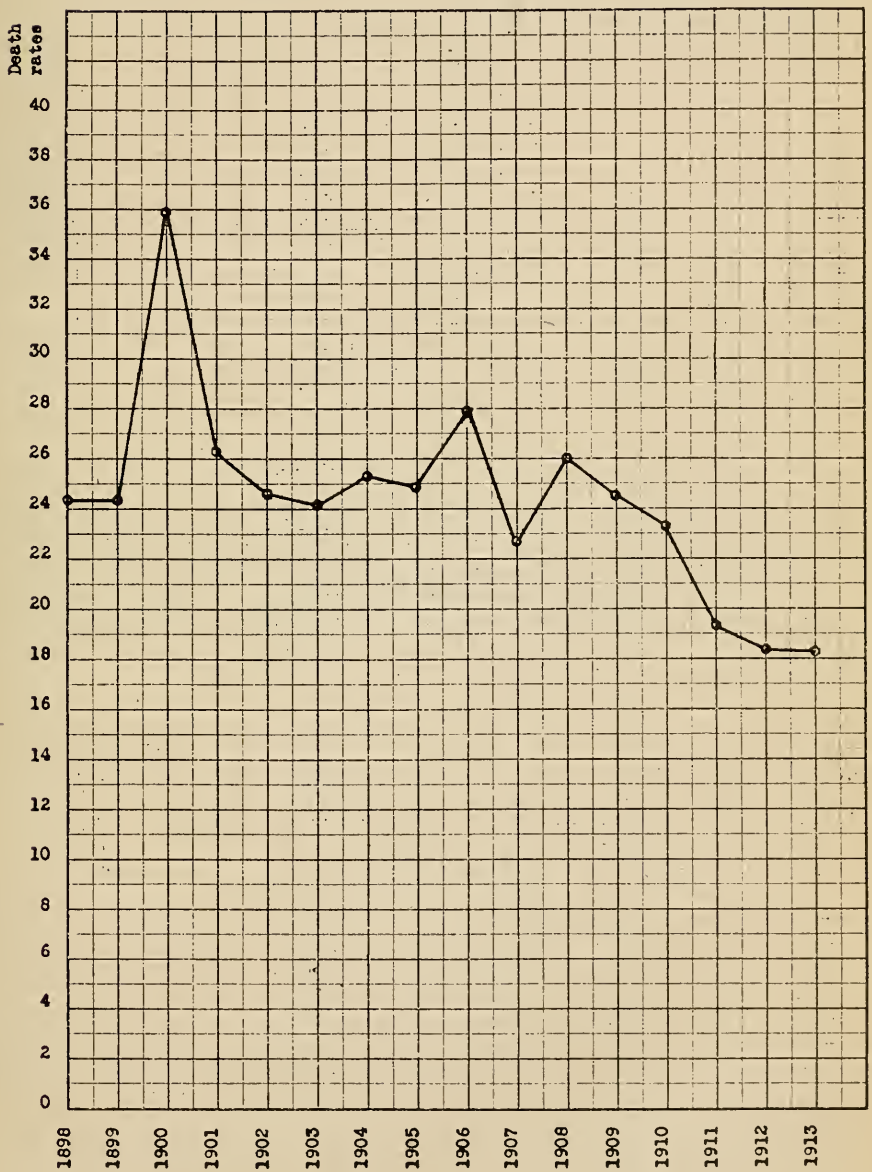
TABLE 18.—*The prevalence of typhoid fever, in Michigan, in each of the thirty years, 1884-1913.*

Years.	*Cases.	Deaths.	Deaths per 100,000 population.
1884	969	290	15.6
1885	715	194	10.2
1886	1,194	282	14.6
1887	3,424	411	20.8
1888	1,511	310	15.4
1889	2,530	681	33.2
1890	1,924	304	14.5
1891	4,670	697	32.7
1892	2,591	538	24.8
1893	3,512	594	26.9
1894	2,805	506	22.6
1895	3,751	621	27.3
1896	2,506	409	17.8
1897	1,900	352	15.1
Average, 1884-1897	2,429	422	21.0
1898	2,874	†572	24.3
1899	3,194	580	24.3
1900	5,122	869	35.9
1901	3,002	645	26.3
1902	2,456	608	24.6
Average, 1898-1902	3,330	655	27.1
1903	2,840	606	24.2
1904	3,028	641	25.3
1905	2,774	636	24.9
1906	3,163	721	27.9
1907	1,953	594	22.7
Average, 1903-1907	2,752	640	25.0
1908	2,656	687	26.0
1909	2,694	653	24.5
1910	3,361	654	23.3
1911	2,660	551	19.3
1912	2,847	534	18.4
Average, 1908-1912	2,844	616	22.1
1913	2,253	539	18.3

*From many localities only the fatal cases were reported, so that the figures in this column do not represent the number of cases that actually occurred.

†The law providing for the compulsory reporting of deaths, in this State, took effect in 1898.

DIAGRAM SHOWING THE DEATH RATES FROM TYPHOID FEVER PER 100,000 POPULATION, IN MICHIGAN, DURING THE YEARS, 1898-1913.



GEOGRAPHICAL DISTRIBUTION OF TYPHOID FEVER.

As indicated by the death rates per 100,000 of population, shown in Table 19, typhoid fever is most prevalent, on the average, in the Upper Peninsular group of counties, and least prevalent in the Central group. During the year 1913, typhoid was most prevalent in the Southern group of counties and least prevalent in the Central group.

The death rate for 1913, compared with the average rate, shows a decrease in each of the divisions, this decrease (expressed in per cent) being noted below:

Divisions.	Per cent decrease in 1913 death rate over average rate for years, 1898-1912.
STATE	25.6
Upper Peninsular counties	44.3
Northern counties	24.0
Central counties	34.1
Southern counties	21.0

The counties having unusually high death rates in 1913, compared with the rate for the State (18.3) for that year, were: Alger (157.7) and Delta (40.1), of the Upper Peninsular group; Alpena (79.7), Antrim (31.8), Kalkaska (59.9), Otsego (32.2) and Roscommon (39.3), of the Northern group; Muskegon (28.5), of the Central group; St. Clair (29.6) and Wayne (30.5), of the Southern group.

TABLE 19.—*Showing the cases, deaths and death rates per 100,000 population from typhoid fever, in Michigan and in each of the counties of the state for 1913, also the averages for the years, 1898-1912, inclusive.*

State and counties by geographical sections.	1913.			Average, 1898-1912.		
	Cases.	Deaths.	Deaths per 100,000 population.	Cases.	Deaths.	Deaths per 100,000 population.
STATE OF MICHIGAN	**2,253**	**539**	**18.3**	**2,976**	**637**	**24.6**
I.—Upper Peninsula	**233**	**55**	**15.7**	**335**	**80**	**28.2**
Alger	54	13	157.7	4	1	22.0
Baraga	1	1	15.1	5	.6	11.0
Chippewa	25	3	11.7	54	10	42.7
Delta	14	13	40.1	50	17	61.4
Dickinson	7	1	4.7	10	2	10.2
Gogebic	5	2	7.6	13	6	30.3
Houghton	18	3	3.1	47	13	18.1
Iron	32	2	10.9	7	2	18.8
Keweenaw	0	0	.....	2	.1	2.7
Luce	1	1	24.6	4	2	53.1
Mackinac	2	1	10.3	4	.9	11.2
Marquette	57	11	25.9	64	13	30.2
Menominee	4	2	7.9	47	10	36.9
Ontonagon	10	2	21.3	20	2	28.5
Schoolcraft	3	0	.....	4	1	13.8
II.—Northern Counties	**261**	**62**	**18.7**	**396**	**79**	**24.6**
Alcona	2	1	17.5	4	.6	10.6
Alpena	99	16	79.7	16	6	31.7
Antrim	14	5	31.8	21	5	34.1
Arenac	3	1	10.7	5	.7	7.4
Benzie	18	0	.....	27	2	21.4
Charlevoix	8	4	19.4	17	5	23.2
Cheboygan	3	1	5.5	15	2	14.2
Clare	1	0	.....	9	2	17.4
Crawford	11	0	.....	6	.7	19.5
Emmet	3	3	15.8	23	4	25.1
Gladwin	6	2	24.0	10	1	15.2
Grand Traverse	20	6	24.9	51	7	30.4
Iosco	5	1	10.7	5	2	19.6
Kalkaska	8	5	59.9	11	3	33.5
Lake	1	0	.....	6	1	21.3
Leelanau	4	0	.....	5	2	15.4
Manistee	17	5	18.9	31	7	24.8
Mason	8	1	4.4	21	5	24.9
Missaukee	0	0	.....	16	2	24.0
Montmorency	0	0	.....	3	.8	22.3
Ogemaw	1	1	11.4	10	2	22.9
Osceola	7	1	5.7	20	4	24.1
Oscoda	0	0	.....	4	*	3.5
Otsego	3	2	32.2	16	4	54.0
Presque Isle	4	1	8.7	13	3	25.0
Roscommon	1	1	39.3	1	.1	7.5
Wexford	14	5	23.2	30	7	35.9
III.—Central Counties	**301**	**76**	**15.3**	**446**	**106**	**23.4**
Bay	12	9	12.7	54	21	31.6
Gratiot	16	1	3.6	44	8	26.5
Huron	18	2	5.8	25	5	15.5
Isabella	12	2	8.8	32	5	21.7
Mecosta	4	4	21.0	20	5	25.7
Midland	23	3	21.9	25	5	33.1
Montcalm	13	3	9.5	24	7	22.4
Muskegon	13	12	28.5	28	8	20.3
Newaygo	11	3	15.3	19	5	27.3
Oceana	15	5	26.7	19	3	19.4
Saginaw	139	24	26.3	85	18	21.3
Sanilac	13	4	12.0	38	8	22.9
Tuscola	12	4	11.6	33	7	19.4

TABLE 19.—*Continued.*

Counties by geographical sections.	1913.			Average, 1898-1912.		
	Cases.	Deaths.	Deaths per 100,000 population.	Cases.	Deaths.	Deaths per 100,000 population.
IV.—Southern Counties	**1,458**	**346**	**19.2**	**1,800**	**371**	**24.3**
Allegan	19	3	7.5	27	6	14.8
Barry	16	3	13.1	19	3	12.5
Berrien	62	11	19.7	47	10	20.2
Branch	7	2	7.9	21	4	15.4
Calhoun	47	14	23.9	71	13	23.3
Cass	9	3	14.3	26	4	20.0
Clinton	7	2	9.1	37	6	22.7
Eaton	38	5	16.4	51	8	25.2
Genesee	56	11	11.9	71	14	30.1
Hillsdale	26	4	13.5	28	6	19.7
Ingham	59	10	17.2	104	16	34.1
Ionia	20	4	12.1	34	8	22.3
Jackson	22	5	8.8	88	12	25.5
Kalamazoo	32	4	6.1	80	11	20.9
Kent	173	27	16.1	311	46	32.0
Lapeer	9	0	.....	29	6	20.8
Lenawee	27	8	16.9	51	11	23.4
Livingston	12	2	11.6	28	5	25.9
Macomb	12	2	6.2	41	9	28.7
Monroe	23	7	21.3	37	8	22.8
Oakland	32	7	13.6	38	9	20.3
Ottawa	19	7	15.0	29	8	18.8
St. Clair	40	15	29.6	117	21	39.2
St. Joseph	7	0	.....	16	3	12.8
Shiawassee	15	2	6.1	30	6	19.2
Van Buren	30	2	6.2	61	10	29.0
Washtenaw	11	2	4.6	35	8	16.8
Wayne	628	184	30.5	273	100	24.1

*Less than one-tenth.

INFLUENCE OF DENSITY OF POPULATION ON THE PREVALENCE OF TYPHOID FEVER.

The prevalence of typhoid fever, as indicated by the death rates shown in Table 20, bears an inverse ratio to the increase in the density of population, assuming that the density of population increases with the increase of the population.

Of the direct influences connected with close aggregation of population, filth conditions of air, and water and soil are most important. If the source of the water supply is pure and the sewerage is good, densely populated towns may be, and are, commonly better off, from a typhoid fever standpoint, than rural districts. But if the reverse is true—impure water supplies and poor sewerage—then the densely populated towns would experience a prevalence proportionately greater than rural localities, owing to the more frequent opportunities of personal contact.

The cities, shown in Table 20, that had lower death rates from typhoid fever in 1913 than the rate in the rural districts in the same year (13.9), were: Jackson, Kalamazoo, Lansing, Ironwood, Menominee and Pontiac. No deaths occurred from typhoid fever in Ann Arbor during that year.

Of the thirteen cities, constituting the group having from 10,000 to 25,000 inhabitants, seven, or 57 per cent, have questionable water supplies, and of these seven cities Alpena has an unquestionably impure water supply. Of the seven cities whose populations range from 25,000 to 50,000, only two, or 29 per cent, have questionable water supplies, while the cities, constituting the group of largest population, have, so far as known, practically pure

water supplies. This, then, would account for the high death rate for that group of cities having the smallest population, also for the comparatively lower death rates of the other two groups of cities.

TABLE 20.—*The cases, deaths and death rates per 100,000 population from typhoid fever, in 1913, also the average deaths and death rates for the years, 1904-1912, in cities of Michigan of 10,000 inhabitants and over.*

Cities.	1913.			Average, 1904-1912.		
	Cases.	Deaths.	Deaths per 100,000 inhabitants.	Cases.	Deaths.	Deaths per 100,000 inhabitants.
CITIES OVER 50,000 INHABITANTS	727	193	27.1	.....	135	24.6
Detroit	475	153	28.3	*492	84	21.4
Grand Rapids	150	22	18.2	328	37	35.0
Saginaw	102	18	34.3	57	14	28.0
CITIES FROM 25,000 TO 50,000 INHABITANTS	168	44	16.6	.....	67	32.6
Battle Creek	27	12	44.8	38	7	28.1
Bay City	9	7	14.8	†	17	41.6
Flint	45	7	13.9	‡77	12	48.3
Jackson	13	4	11.6	68	9	32.4
Kalamazoo	25	4	9.0	62	8	22.4
Lansing	40	1	2.7	57	9	30.9
Muskegon	9	9	35.1	20	5	22.6
CITIES FROM 10,000 TO 25,000 INHABITANTS	217	50	28.6	.....	80	48.7
Adrian	2	2	18.5	†	3	25.4
Alpena	88	12	93.3	†	7	54.9
Ann Arbor	6	0	.....	10	3	20.4
Escanaba	9	9	63.2	†	18	143.3
Ironwood	2	1	7.0	†	4	35.6
Ishpeming	17	3	23.3	7	1	8.9
Manistee	12	5	40.9	14	3	25.5
Marquette	19	4	33.6	§34	7	62.3
Menominee	3	1	9.8	†	7	69.0
Pontiac	14	2	12.2	‖40	4	31.3
Port Huron	10	5	27.4	§58	12	59.9
Sault Ste. Marie	25	3	22.7	§24	6	48.9
Traverse City	10	3	23.9	44	5	40.5

*3 year average.
†Fatal cases only reported.
‡7 year average.
§8 year average.
‖4 year average.

THE PREVALENCE OF TYPHOID FEVER IN URBAN AND RURAL LOCALITIES.

Based on the death rates per 100,000 of population in the urban and rural localities, as shown in Table 21 and the diagram immediately following, typhoid fever is more prevalent in the urban localities than in the rural, and this difference of prevalency is becoming rapidly greater, owing to the more rapid decline of the rural death rate.

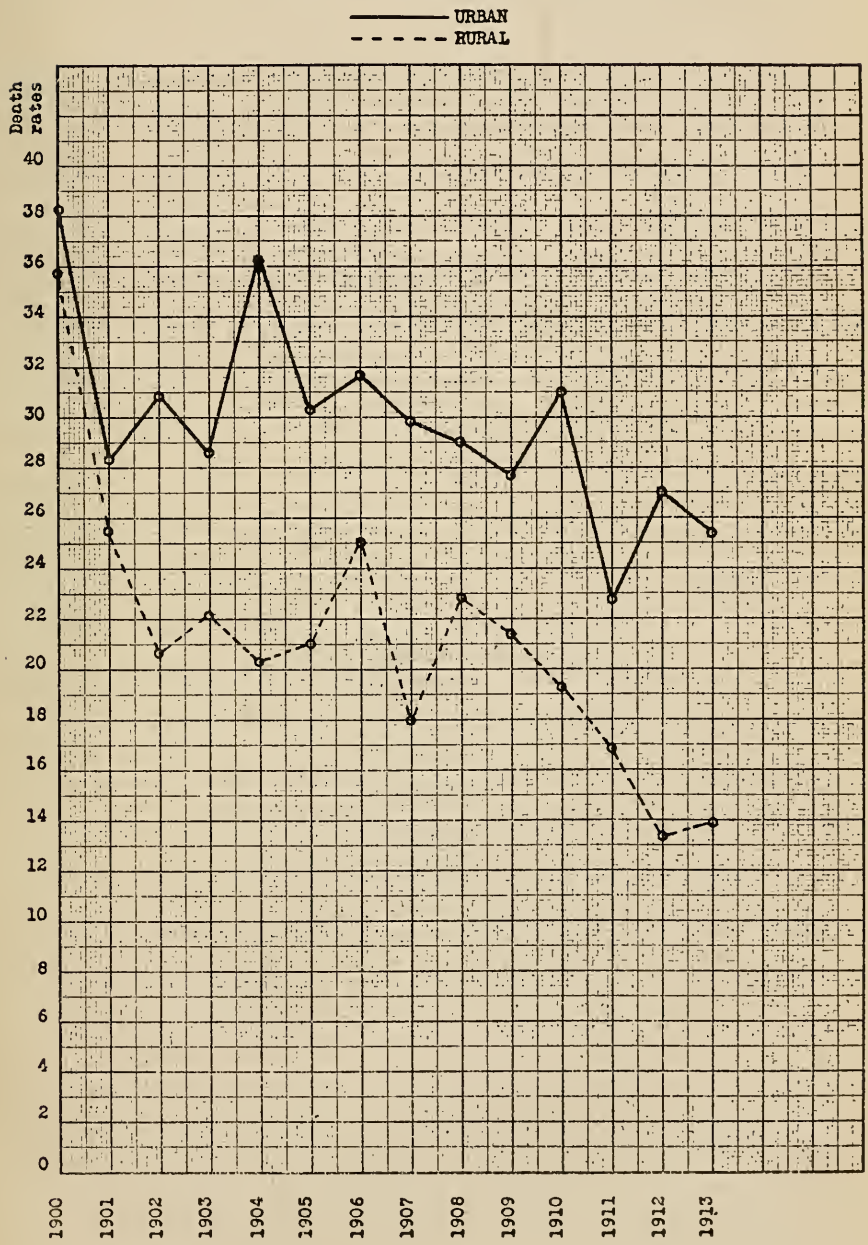
The maximum death rates from this disease, in both the urban and rural localities, occurred in 1900, when the rate for the cities was 38.2 and the rate for the rural districts was 35.8. The minimum death rate for the cities was registered in 1911, when it was 22.8, and the minimum rate for the rural districts occurred in 1912, when it was 13.4. Thus, the reduction from the maximum to the minimum rate was 40.3 per cent in the cities, while, by the same comparison, the reduction amounted to 61.2 per cent in the rural districts.

TABLE 21.—*The death rates per 100,000 population from typhoid fever in the urban and rural localities, of Michigan, during each of the years, 1900-1913.*

Years.	Death rates per 100,000 population in—	
	Urban.	Rural.
1900	38.2	35.8
1901	28.3	25.5
1902	30.9	21.7
1903	28.6	22.1
1904	36.2	20.3
1905	30.3	21.0
1906	31.7	25.0
1907	29.8	18.0
1908	29.0	22.8
1909	27.7	21.4
1910	31.0	19.3
1911	22.8	16.8
1912	27.0	13.4
1913	25.4	13.9

NOTE.—The term "Urban" as here used is restricted to municipalities having 10,000 or more inhabitants in 1910; smaller places being included with the "Rural districts."

DIAGRAM SHOWING THE DEATH RATES FROM TYPHOID FEVER PER 100,000 POPULATION OF THE URBAN AND RURAL LOCALITIES OF MICHIGAN, DURING THE YEARS, 1900-1913.



THE SEASONAL PREVALENCE OF TYPHOID FEVER.

The seasonal prevalence of typhoid fever, as indicated by the average number of monthly deaths reduced to a standard of 100, as shown in Table 22, reaches its maximum during the month of October, while the minimum prevalence occurs in the month of June.

TABLE 22.—*The seasonal fatality from typhoid fever, in Michigan, as indicated by the average number of deaths from this disease in each month in the sixteen years, 1898-1913.*

Month.	Average number of deaths occurring in each month during the years 1898-1913.	Monthly deaths reduced to a standard of 100.
January	43	79.6
February	38	75.9
March	41	75.9
April	39	74.0
May	35	64.8
June	29	55.6
July	35	64.8
August	53	98.1
September	85	163.0
October	100	185.2
November	78	150.0
December	55	101.9
Annual average	631	100.0

AGE DISTRIBUTION OF TYPHOID FEVER.

Typhoid fever is essentially a disease of youth and middle age. Deaths from this disease are comparatively rare in childhood and old age, as may be seen by reference to Table 23 and accompanying diagram. These are average death rates, so, of course, do not hold good at all times and for every community. Thus, in a city where the drinking-water of a school has been contaminated, or where there has been an epidemic caused by milk, the proportion of deaths may be especially high among children. It will be noted that the death rate in middle life is about two and one-half times what it is in old age, and over three times what it is in childhood. It is generally taken for granted that persons of middle age are more susceptible to this disease than are those of childhood and old age, for the reason that the ratio of deaths at the middle age of life to the population at that age, is the highest. This, however, is not a true explanation. A better reason would be that persons of middle life are subjected to greater exposure. This is also true with tuberculosis.

In connection with this study, it might be well to consider the fatality rate (deaths per 100 cases) of the disease at the different age groups and for each sex. This data, for the year 1912, may be found in Table 23A. It will be noted that, of the children under five years of age who were taken sick with typhoid fever, 20 per cent of their cases proved fatal. At the ages 5-14 the fatality rate was at its minimum, and after this age the fatality rate increases with the advancement of age, reaching its maximum at the oldest ages

shown in the table—65 years and over. As between the sexes, the fatality rate, at all ages, was slightly higher among the males than among the females for the year shown in the table. At the different ages the fatality rate varies between the sexes. Under fifteen years of age, the disease was more fatal to the females than to the males, but after this age the fatality rate of the males exceeds that of the females at every age group, with but few exceptions.

TABLE 23.—*The influence of age in fatal cases of typhoid fever, in Michigan, as indicated by the average number of annual deaths from this disease occurring at each age group and the death rates per 100,000 population of the same age, during the years, 1898-1913, inclusive.*

Age groups.	Average annual number of deaths during the years, 1898-1913.	Death rates per 100,000 population of same age.
ALL AGES	631	24.2
Under 1 year	5	7.7
Under 5 years	32	11.3
5-9 years	36	13.4
10-19 years	137	26.7
20-29 years	177	38.7
30-39 years	101	27.4
40-49 years	65	22.0
50-59 years	43	20.2
60-69 years	25	18.6
70-79 years	13	19.8
80 years and over	2	14.0
Unknown	.7	.....

DIAGRAM SHOWING THE AVERAGE DEATH RATES FROM TYPHOID FEVER PER 100,000 POPULATION OF EACH AGE GROUP, IN MICHIGAN, DURING THE YEARS, 1898-1913, INCLUSIVE.

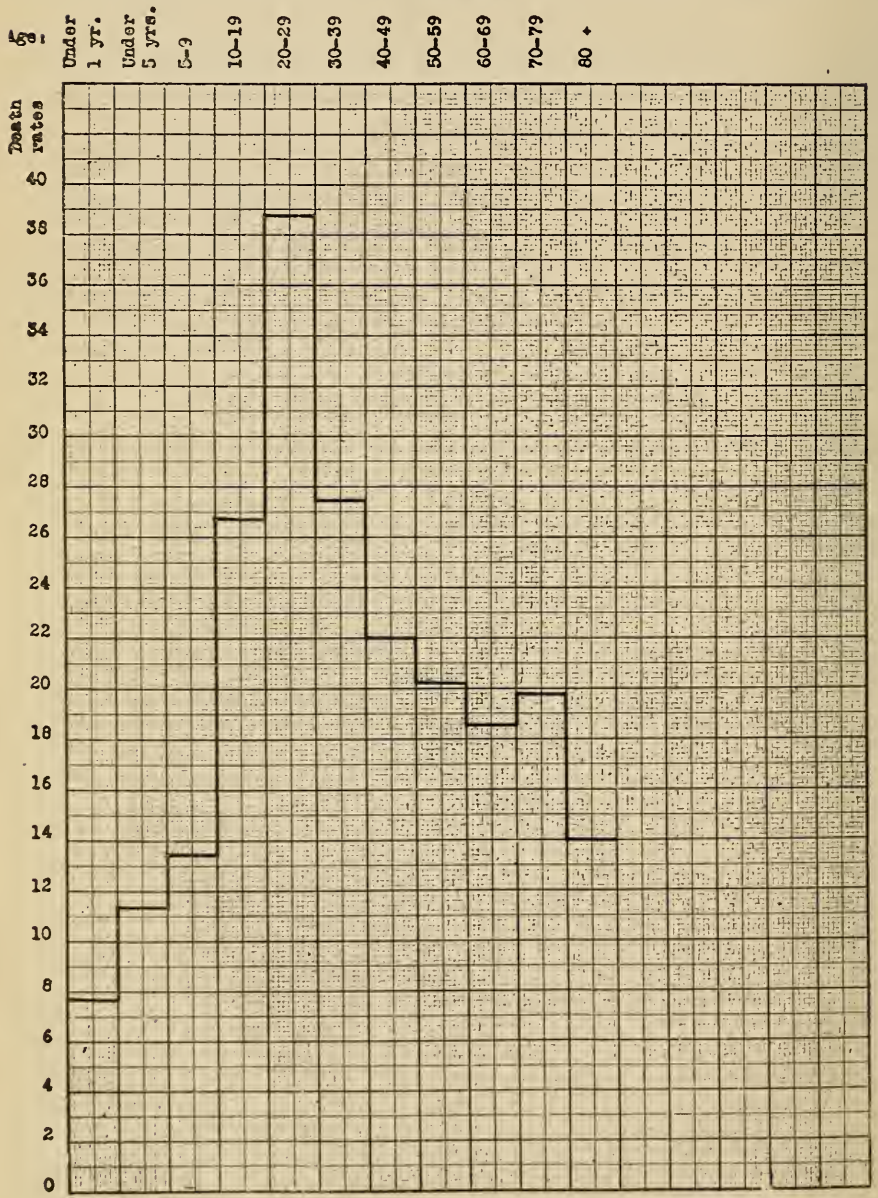


TABLE 23A.—*The influence of age and sex in typhoid fever, as indicated by the number of cases and deaths, of those persons whose ages were known, that occurred at the various age groups and of each sex, in Michigan, in 1912.*

Age groups.	Number of persons attacked.			Number of deaths.			Percentage fatality.			Ratio of number of cases to deaths.		
	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.
Under 5 years	140	85	55	28	19	9	20.0	22.4	16.4	5.0	4.5	6.1
5 to 9 years	310	148	162	25	8	17	8.1	5.4	10.5	12.4	18.5	9.5
10 to 14 years	294	158	136	26	9	17	8.8	5.7	12.5	11.3	17.6	8.0
15 to 19 years	391	192	199	76	42	34	19.4	21.9	17.1	5.1	4.6	5.9
20 to 24 years	435	249	186	85	52	33	19.5	20.9	17.7	5.1	4.8	5.6
25 to 29 years	307	186	121	60	38	22	19.5	20.4	18.2	5.1	4.9	5.5
30 to 34 years	238	140	98	51	34	17	21.4	24.3	17.3	4.7	4.1	5.8
35 to 39 years	187	132	55	51	36	15	27.3	27.3	27.3	3.7	3.7	3.7
40 to 44 years	123	85	38	29	22	7	23.6	24.7	18.4	4.2	3.9	5.4
45 to 49 years	92	50	42	25	14	11	27.2	28.0	26.0	3.7	3.6	3.8
50 to 54 years	68	42	26	25	16	9	36.8	38.1	34.6	2.7	2.6	2.9
55 to 59 years	53	31	22	16	9	7	30.2	29.0	31.8	3.3	3.4	3.1
60 years and upwards	53	21	32	30	14	16	56.6	66.7	50.0	1.8	1.5	2.0
Total	2,691	1,519	1,172	527	313	214	19.6	20.6	18.3	5.1	4.9	5.5

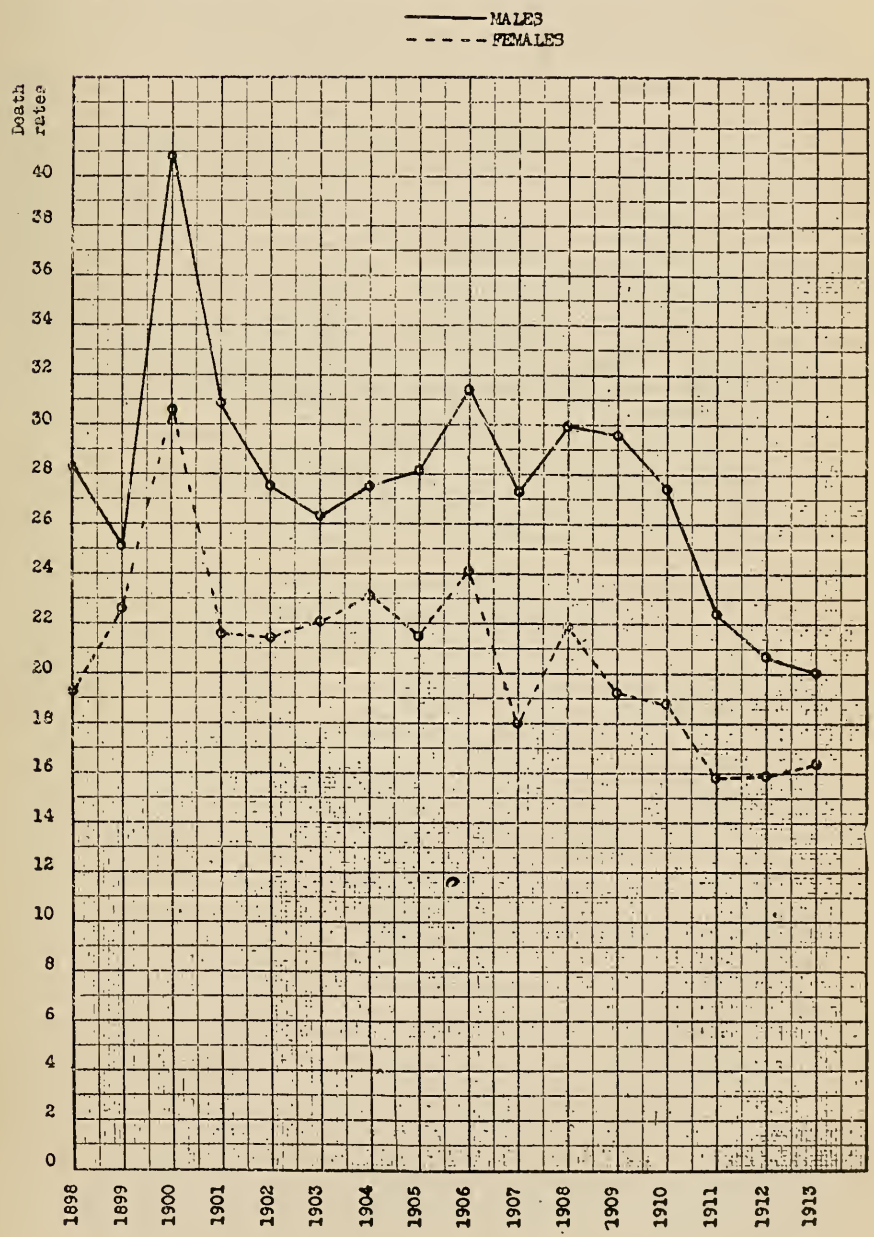
SEX DISTRIBUTION OF TYPHOID FEVER.

As may be seen by Table 24, and the diagram following the same, typhoid fever is more common among males than among females. In 1898, the death rate of the males was 47 per cent higher than the rate for the females for that year. This difference is becoming gradually less, as in 1913, the excess of the male death rate over that of the female was only 22 per cent. The percentage of excess varies also at the different age groups. Girls seem to acquire the disease at an earlier age than boys, so that in case of children less than fifteen years old, the death rate per 100,000 of their population is greater among the females than among the males. After the fifteenth year of life, the death rates of the males are greater, at practically every age group, than the rates for the females. It seems reasonable to suppose that this difference is due to differences in exposure. In childhood, the difference between the environments of the two sexes is not material; but in middle life, when the activities of life are greatest, it may be supposed to be at its maximum; while in old age, the environments again tend to become similar.

TABLE 24.—*The influence of sex in fatal cases of typhoid fever, in Michigan, as indicated by the number of annual deaths and the death rates per 100,000 population of each sex, during the years, 1898-1913.*

Years.	Annual deaths.		Death rates per 100,000 population of same sex.	
	Males.	Females.	Males.	Females.
1898	348	324	28.3	19.3
1899	313	267	25.1	22.6
1900	510	359	40.8	30.6
1901	389	256	30.8	21.6
1902	351	257	27.6	21.4
1903	338	268	26.3	22.0
1904	357	284	27.5	23.1
1905	368	268	28.1	21.5
1906	417	304	31.4	24.1
1907	364	230	27.2	18.0
1908	404	283	29.9	21.9
1909	403	250	29.6	19.2
1910	399	255	27.4	18.8
1911	332	219	22.4	15.9
1912	312	222	20.7	15.9
1913	307	232	20.0	16.4
Annual averages	369	261	27.5	20.6

DIAGRAM SHOWING THE DEATH RATES FROM TYPHOID FEVER PER 100,000 POPULATION OF EACH SEX, IN MICHIGAN, DURING THE YEARS, 1898-1913.



RESTRICTIVE AND PREVENTIVE MEASURES IN TYPHOID FEVER.

By reference to Table 25 may be seen the per cent of instances in which the local health officers enforced the restrictive and preventive measures, recommended by this Board.

The placarding of the premises, in which persons suffering from this disease, are confined, was enforced in 62 per cent of the instances in 1913, compared with 67 per cent during previous years.

The sick persons were said to have been isolated in 84 per cent of the cases in 1913, compared with 83 per cent in previous years.

The disinfection of the discharges from the bowels and bladder is the most important measure recommended by this Board tending to prevent the spread of this disease to others. In fact, the disinfection of these discharges is just as important in the prevention of typhoid fever as the disinfection of sputa is in the prevention of the spread of tuberculosis. In 1913, this measure was enforced in 85 per cent of the cases, while on the average, it has been enforced in 86 per cent of the cases.

The rooms occupied by the patients were said to have been disinfected in 86 per cent of the cases in 1913, which is a slight improvement over previous years, the average being 84 per cent. This measure becomes doubly necessary, in preventing the spread of this disease, providing the discharges from the bowels and bladder are not properly disinfected.

TABLE 25.—*Restrictive and preventive measures in typhoid fever, in Michigan, in 1913, compared with the average for the years, 1905-1912, inclusive.*

Restrictive and preventive measures.	1913.		Average, 1905-1912.	
	Cases.	Per cent.	Cases.	Per cent.
PLACARDING OF PREMISES:				
Enforced	1,384	62	1,883	67
Neglected, not stated or statements doubtful	866	38	917	33
ISOLATION OF SICK PERSONS:				
Enforced	1,893	84	2,332	83
Neglected	50	2	123	5
Not stated or statements doubtful	307	14	345	12
DISCHARGES FROM THE BOWELS AND BLADDER:				
Disinfected	1,918	85	2,410	86
Not disinfected	10	*	41	2
Not stated or statements doubtful	322	14	349	12
CLOTHING AND OTHER ARTICLES SOILED BY DISCHARGES:				
Disinfected	1,933	86	2,441	87
Not disinfected	4	*	22	1
Not stated or statements doubtful	313	14	337	12
INFECTED ROOMS:				
Disinfected	1,931	86	2,337	84
Not disinfected	13	*	94	3
Not stated or statements doubtful	306	13	369	13

*Less than one per cent.

EPIDEMIC CEREBRO SPINAL MENINGITIS IN MICHIGAN IN 1913 AND PRECEDING YEARS.

GENERAL PREVALENCE.

As indicated by the death rates per 100,000 of population, epidemic cerebro spinal meningitis, as a disease, is becoming less prevalent in this State each year, the death rate for 1913 (12.1) being the lowest recorded during any of the years shown in Table 26.

This disease is essentially one of childhood, over 56 per cent of the deaths that occurred from this disease during the years, 1899-1913, being among children under five years of age. As between the sexes, meningitis is more prevalent among the males.

The months in which this disease is most prevalent are March, April and May, and least prevalent during the months of October, November and December.

TABLE 26.—*The prevalence of epidemic cerebro spinal meningitis, in Michigan, in each of the sixteen years, 1898-1913.*

Years.	Deaths.	Deaths per 100,000 population.
1898	671	28.4
1899	1,051	44.0
1900	514	21.2
1901	427	17.4
1902	384	15.5
Average, 1898-1902	609	25.1
1903	382	15.3
1904	401	15.8
1905	460	18.0
1906	503	19.5
1907	569	21.8
Average, 1903-1907	463	18.1
1908	480	18.2
1909	468	17.6
1910	526	18.7
1911	487	17.0
1912	423	14.6
Average, 1908-1912	477	17.2
1913	358	12.1

DIPHTHERIA IN MICHIGAN IN 1913 AND PRECEDING YEARS.

GENERAL PREVALENCE.

As may be seen by Table 27, diphtheria was unusually prevalent in Michigan in 1913. During that year there were reported to this Board 5,505 cases of the disease, of which number 676, or 12.3 per cent, proved fatal. This is the largest number of cases of diphtheria ever reported to this Board in any year since its establishment. The deaths correspond to an annual death rate of 22.9 per 100,000 of population, and which represents the highest death rate, from this disease, recorded since 1903, when it was 27.4. While this disease was unusually prevalent in 1913, still, as indicated by the fatality rate (deaths per 100 cases), the ratio of deaths to cases was less in that year than in any year shown in the table. As the fatality rate varies with the reporting of non-fatal cases, this low ratio of deaths to cases in 1913, compared with other years, might be only apparent, for the reasons that physicians, during that year, may have reported a larger per cent of their non-fatal cases than in former years.

The fact that certain diseases, especially those of an infectious character, recur after an interval of years, shows that, apart from the influence of the season of the year, there are periods of change which require for their completion a series of years. Two factors appear to be at work: (1) The influence of an accumulation of susceptible persons, who, in diphtheria, are children under ten years of age (see Table 31), and (2) certain extraneou conditions which appear to be operative in determining the periodicity, but about which little is known. The year in which this disease was unusually prevalent, since the use of antitoxin, was in 1903, which is just ten years previous to the year under discussion, and in which diphtheria was again unusually prevalent. The experience of this State, then, would substantiate the above statement, relative to the accumulation of susceptible persons between the intervals of two epidemics of diphtheria.

TABLE 27.—*The prevalence of diphtheria, in Michigan, during the ten years, 1884-1893, and before the use of antitoxin, also a similar statement for the twenty years, 1894-1913, since the beginning of the general use of antitoxin.*

Years.	*Cases.	Deaths.	Deaths per 100 cases.	Deaths per 100,000 population.
1884	3,915	905	23.1	48.8
1885	4,018	964	24.0	50.9
1886	4,244	982	23.1	50.8
1887	3,382	825	24.4	41.8
1888	2,228	532	23.9	26.4
1889	3,157	683	21.6	33.3
1890	4,206	1,050	25.0	50.1
1891	4,385	1,002	22.9	47.0
1892	4,818	1,099	22.8	50.7
1893	4,736	1,092	23.1	49.5
Average, 1884-1893	3,909	913	23.4	44.9
1894	3,852	744	19.3	33.2
1895	3,433	708	20.6	31.2
1896	4,013	757	18.9	32.9
1897	4,132	756	18.3	32.4
Average, 1894-1897	3,858	741	19.2	32.4
1898	2,357	456	19.3	19.4
1899	2,154	435	20.2	18.2
1900	2,706	529	19.5	21.9
1901	2,498	502	20.1	20.5
1902	2,993	504	16.8	20.4
Average, 1898-1902	2,542	485	19.1	20.1
1903	3,670	686	18.7	27.4
1904	3,510	515	14.7	20.4
1905	2,159	478	22.1	18.7
1906	3,648	472	12.9	18.3
1907	2,935	421	14.3	16.1
Average, 1903-1907	3,184	514	16.2	20.1
1908	2,658	343	12.9	13.0
1909	3,109	395	12.7	14.9
1910	3,433	495	14.4	17.6
1911	3,762	473	12.6	16.6
1912	3,294	465	14.1	16.0
Average, 1908-1912	3,251	434	13.4	15.6
1913	5,505	676	12.3	22.9

*From many localities only the fatal cases were reported, so that the figures in this column do not represent the number of cases that actually occurred.

INFLUENCE OF DENSITY OF POPULATION ON THE PREVALENCE OF DIPHTHERIA.

As indicated by the death rates, shown in Table 28, diphtheria is most prevalent in the large centers of population, both on the average and for the single year of 1913. On the average, the disease is more prevalent in the group of cities of from 10,000 to 25,000 population than in the group having from 25,000 to 50,000 inhabitants, but in 1913 the death rates of the two groups were identical.

As previously stated, diphtheria is more prevalent among children under ten years of age than at any other age group, therefore, in addition to the influence that density of population might have on the prevalence of the disease, any variation in the percentages that the number of persons under ten years of age bear to the total population of each group of cities, is, necessarily, a factor to be considered in comparing the prevalence of diphtheria in one group of cities with that of another.

TABLE 28.—*The cases, deaths and death rates per 100,000 population from diphtheria, in 1913, also the averages for the years, 1904-1912, in cities of Michigan of 10,000 inhabitants and over.*

Cities.	1913.			Average, 1904-1912.		
	Cases.	Deaths.	Deaths per 100,000 inhabitants.	Cases.	Deaths.	Deaths per 100,000 inhabitants.
CITIES OVER 50,000 INHABITANTS	3,280	359	50.3	.....	156	28.5
Detroit	2,720	300	55.6	*1,036	124	31.6
Grand Rapids	414	53	43.1	202	21	19.9
Saginaw	146	6	11.4	125	11	22.0
CITIES FROM 25,000 TO 50,000 INHABITANTS	269	32	12.0	.....	28	13.6
Battle Creek	80	7	26.1	62	4	16.1
Bay City	13	2	4.2	46	6	14.7
Flint	67	8	15.9	23	3	12.1
Jackson	3	3	8.7	43	7	25.2
Kalamazoo	44	5	11.3	45	3	8.4
Lansing	41	5	13.6	27	3	10.3
Muskegon	21	2	7.8	21	2	9.0
CITIES FROM 10,000 TO 25,000 INHABITANTS	300	21	12.0	.....	34.7	21.1
Adrian	4	2	18.5	11	1	11.4
Alpena	59	1	7.8	5	3	23.5
Ann Arbor	31	1	6.7	12	1	6.8
Escanaba	3	3	21.1	30	4	31.8
Ironwood	13	0	.....	†	5	44.5
Ishpeming	7	2	15 6	60	6	53.3
Manistee	20	1	8.2	17	1	8.5
Marquette	4	1	8.4	15	2	17.8
Menominee	1	0	.....	4	1	9.8
Pontiac	41	2	12.2	‡61	2	15.7
Port Huron	29	5	27.4	38	5	24.5
Sault Ste. Marie	85	3	22.7	12	3	24.4
Traverse City	3	0	.....	10	.7	5.7

*Eight year average.
†Fatal cases only reported.
‡Five year average.

THE PREVALENCE OF DIPHTHERIA IN URBAN AND RURAL LOCALITIES.

In Table 29, and the diagram following, are shown the death rates from diphtheria per 100,000 of population in the urban and rural localities of Michigan.

As indicated by these death rates, diphtheria is much more prevalent in

cities than in rural districts, and as may be noted by the diagram mentioned above, the prevalence of the disease, although fluctuating somewhat, is on the downward trend in the rural localities. This is also true of the cities for the years 1903-1908, inclusive, but since 1908, there seems to be a gradual upward trend in the rate up to 1912, when a sharp increase in the rate is noted in 1913.

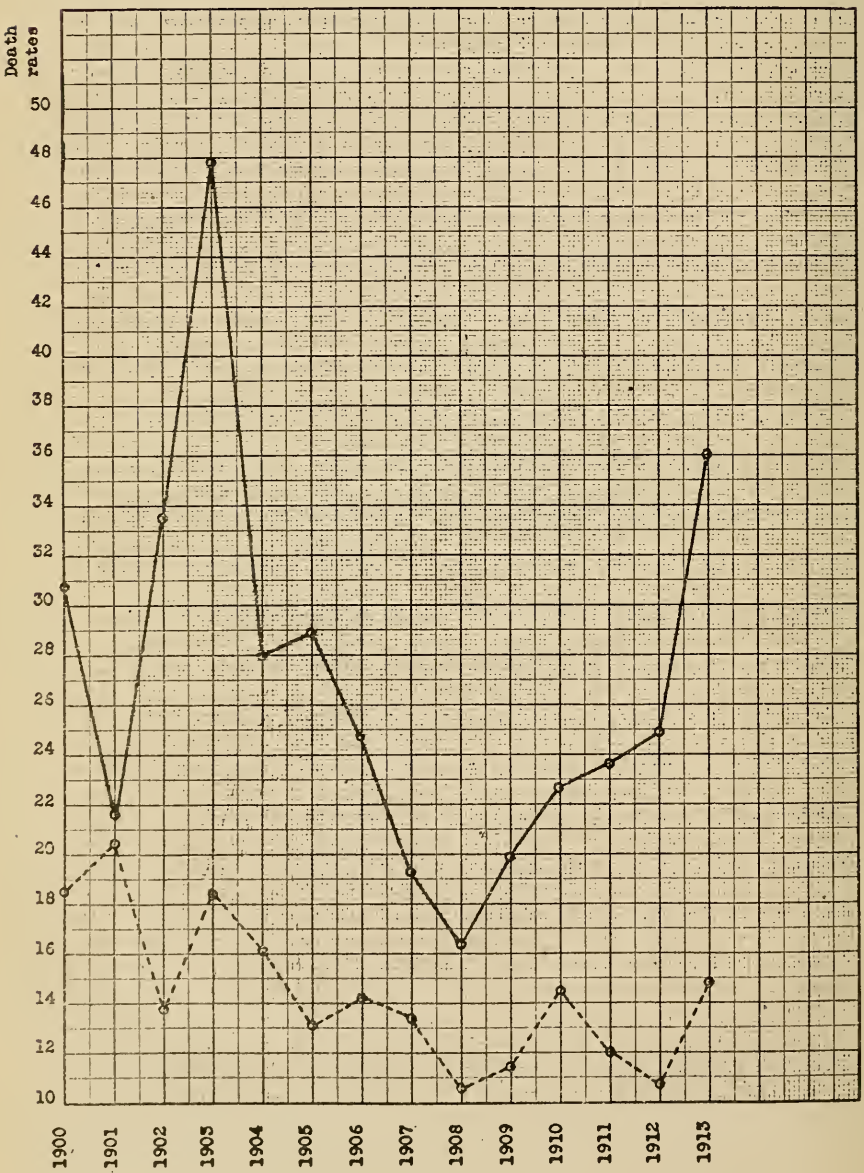
TABLE 29.—*The death rates per 100,000 population from diphtheria in the urban and rural localities, of Michigan, during each of the years, 1900-1913.*

Years.	Death rates per 100,000 population in—	
	Urban.	Rural.
1900	30.8	18.5
1901	21.7	20.4
1902	33.5	13.8
1903	47.8	18.4
1904	28.0	16.1
1905	28.9	13.1
1906	24.7	14.2
1907	19.3	13.4
1908	16.4	10.6
1909	19.9	11.4
1910	22.7	14.5
1911	23.7	12.0
1912	24.9	10.7
1913	36.0	14.8

NOTE.—The term "Urban" as here used is restricted to municipalities having 10,000 or more inhabitants in 1910; smaller places being included with the "Rural districts."

DIAGRAM SHOWING THE DEATH RATES FROM DIPHTHERIA PER 100,000 POPULATION OF THE URBAN AND RURAL LOCALITIES OF MICHIGAN, DURING THE YEARS, 1900-1913.

———— URBAN
- - - - - - RURAL



THE SEASONAL PREVALENCE OF DIPHTHERIA.

As may be seen by Table 30, diphtheria is most prevalent during the months of from October to February, inclusive, and least prevalent during the months of July and August.

TABLE 30.—*The seasonal fatality from diphtheria, in Michigan, as indicated by the average number of deaths from this disease in each month in the sixteen years, 1898-1913.*

Month.	Average number of deaths occurring in each month during the years 1898-1913.	Monthly deaths reduced to a standard of 100.
January	56	133.3
February	42	111.9
March	35	83.3
April	35	85.7
May	32	76.2
June	30	73.8
July	26	61.9
August	27	64.3
September	38	92.8
October	55	131.0
November	60	145.2
December	56	133.3
Annual average	492	100.0

AGE DISTRIBUTION OF DIPHTHERIA.

As indicated by the death rates per 100,000 living at each age group, as shown in Table 31, diphtheria is most prevalent among children under ten years of age. Of those under ten years of age, children whose ages range from 1-5 years seem to be the most susceptible to this disease. The rates for the children under one year of age and from 5-9 years are almost identical.

TABLE 31.—*The influence of age in fatal cases of diphtheria, in Michigan, as indicated by the average number of annual deaths from this disease at each age group and the death rates per 100,000 population of the same age, during the years, 1898-1913, inclusive.*

Age groups.	Average annual number of deaths during the years, 1898-1913.	Death rates per 100,000 population of same age.
ALL AGES	490	18.5
Under 1 year	32	53.8
Under 5 years	245	87.5
5-9 years	149	55.4
10-19 years	70	13.7
20-29 years	14	3.0
30-39 years	5	1.4
40-49 years	4	1.3
50-59 years	2	0.8
60-69 years	.6	0.5
70-79 years	.4	0.6
80 years and over	.4	2.2
Unknown	.2	.....

WHOOPING-COUGH IN MICHIGAN IN 1913 AND PRECEDING YEARS.

GENERAL PREVALENCE.

During the year 1913, there were reported to this Board 929 cases of whooping-cough, of which number 276, or 29.7 per cent, proved fatal. This disease, as indicated by the death rates, was more prevalent in 1913 than during the two preceding years, while by comparing the number of reported cases, it would seem to have been less prevalent, but more fatal, in 1913. This high fatality rate is, undoubtedly, only apparent, as it is not believed that the number of cases reported in 1913 bore as large a per cent to the number of cases actually in existence in that year as in the two preceding years.

TABLE 32.—*The prevalence of whooping-cough, in Michigan, during the twenty-eight years, 1886-1913.*

Years.	*Cases.	Deaths.	Deaths per 100 cases.	Deaths per 100,000 population.
1886	2,642	62	2.3	3.2
1887	2,267	59	2.6	2.0
1888	2,502	49	2.0	2.4
1889	2,694	41	1.5	2.0
1890	983	20	2.0	1.0
1891	2,360	101	4.3	4.7
1892	3,188	77	2.4	3.6
1893	4,047	134	3.3	6.1
1894	4,555	123	2.7	5.5
1895	4,284	109	2.5	4.8
1896	5,466	91	1.7	4.0
1897	3,978	72	1.8	3.1
Average, 1886-1897	3,247	78	2.4	3.6
1898	5,300	282	5.3	12.0
1899	6,509	238	3.7	10.0
1900	3,397	208	6.1	8.6
1901	2,955	163	5.5	6.7
1902	3,534	289	8.2	11.7
Average, 1898-1902	4,339	236	5.4	9.8
1903	4,172	383	9.2	15.3
1904	1,779	148	8.3	5.8
1905	1,196	131	11.0	5.1
1906	1,364	469	34.4	18.1
1907	872	223	25.6	8.5
Average, 1903-1907	1,877	271	14.4	10.6
1908	1,248	305	24.4	11.6
1909	1,054	217	20.6	8.1
1910	1,136	318	28.0	11.3
1911	1,897	254	13.4	8.9
1912	1,255	252	20.0	8.7
Average, 1908-1912	1,318	269	20.4	9.7
1913	929	276	29.7	9.3

*From many localities only the fatal cases were reported, so that the figures in this column do not represent the number of cases that actually occurred.

THE SEASONAL PREVALENCE OF WHOOPING-COUGH.

As indicated by the figures under the caption "Monthly deaths reduced to a standard of 100," in Table 33, whooping-cough is unusually prevalent during the months of from February to September, inclusive, and least prevalent during the months of from October to January, inclusive.

TABLE 33.—*The seasonal fatality from whooping-cough, in Michigan, as indicated by the average number of deaths from this disease in each month in the sixteen years, 1898-1913.*

Month.	Average number of deaths occurring in each month during the years, 1898-1913.	Monthly deaths reduced to a standard of 100.
January	18	81.8
February	21	104.5
March	27	122.7
April	26	122.7
May	27	122.7
June	21	100.0
July	26	118.2
August	26	118.2
September	21	100.0
October	15	68.2
November	15	68.2
December	17	77.3
Annual average	260	100.0

AGE DISTRIBUTION OF WHOOPING-COUGH.

Whooping-cough, as indicated by the ratio of deaths at a given age to the population of the same age, as shown in Table 34, is essentially a disease of very young children. The death rate among children under one year of age is 273.7 per 100,000 children living at that age, while the rate was 89.0 among children of from one to five years of age.

TABLE 34.—*The influence of age in fatal cases of whooping-cough, in Michigan, as indicated by the average number of annual deaths occurring from this disease at each age group and the death rates per 100,000 population of the same age, during the years, 1898-1913, inclusive.*

Age groups.	Average annual number of deaths during the years, 1898-1913.	Death rates per 100,000 population of same age.
ALL AGES	260	9.9
Under 1 year	164	273.7
Under 5 years	249	89.0
5-9 years	8	3.0
10-19 years	2	0.3
20 years and over	1	0.06

SEX DISTRIBUTION OF WHOOPING-COUGH.

As will be seen by the death rates per 100,000 population of each sex, contained in Table 35, whooping-cough, on the average, is slightly more prevalent among females than among males, but the difference between the two rates is so small that it could hardly be assumed that females are more susceptible to this disease than are the males.

TABLE 35.—*The influence of sex in fatal cases of whooping-cough, in Michigan, as indicated by the number of yearly deaths and the death rates per 100,000 population of each sex, during the years, 1898-1913, inclusive.*

Years.	Annual deaths.		Death rates per 100,000 population of same sex.	
	Males.	Females.	Males.	Females.
1898	130	152	10.5	13.1
1899	120	118	9.6	10.0
1900	95	113	7.6	9.6
1901	74	89	5.8	7.5
1902	123	166	9.6	13.8
1903	178	205	13.8	16.9
1904	63	85	4.8	6.9
1905	53	78	4.0	6.3
1906	237	232	17.9	18.4
1907	112	111	8.4	8.7
1908	137	168	10.2	13.0
1909	107	110	7.9	8.4
1910	137	181	9.4	13.4
1911	127	127	8.6	9.2
1912	114	138	7.6	9.9
1913	127	149	8.3	10.5
Annual averages	121	139	9.0	10.1

SCARLET FEVER IN MICHIGAN IN 1913 AND PRECEDING YEARS.

GENERAL PREVALENCE.

As indicated by the death rates per 100,000 of population, as shown in Table 36, scarlet fever was more prevalent in this State in 1913 than it has been for the past two years. The ratio of deaths to cases seems to have been unusually high also, this ratio being higher than for any year since 1906. This, of course, might have been due to the non-reporting of a less proportionate number of the cases that recovered compared with other years.

TABLE 36.—*The prevalence of scarlet fever, in Michigan, during the thirty years, 1884-1913.*

Years.	*Cases.	Deaths.	Deaths per 100 cases.	Deaths per 100,000 population.
1884	2,476	230	9.3	12.4
1885	2,750	187	6.8	9.9
1886	3,046	275	9.0	14.2
1887	3,400	314	9.2	15.9
1888	2,989	200	6.7	9.9
1889	3,535	166	4.7	8.1
1890	3,835	162	4.2	7.7
1891	6,212	286	4.6	13.4
1892	7,075	487	6.9	22.5
1893	6,065	415	6.8	18.8
1894	5,500	203	3.7	9.1
1895	3,908	125	3.2	5.5
1896	2,646	81	3.1	3.9
1897	2,482	115	4.6	4.9
Average, 1884-1897	3,994	232	5.8	11.0
1898	2,409	91	3.8	3.9
1899	4,345	144	3.3	6.0
1900	6,734	272	4.0	11.2
1901	7,726	312	4.0	12.7
1902	6,582	277	4.2	11.2
Average, 1898-1902	5,559	219	3.9	9.1
1903	5,353	200	3.7	8.0
1904	4,088	210	5.1	8.3
1905	2,286	123	5.4	4.8
1906	3,066	227	7.4	8.8
1907	2,514	159	6.3	6.1
Average, 1903-1907	3,461	184	5.3	7.2
1908	3,087	194	6.3	7.4
1909	5,153	275	5.3	10.3
1910	6,501	297	4.6	10.6
1911	5,177	208	4.0	7.3
1912	4,533	186	4.1	6.4
Average, 1908-1912	4,890	232	4.7	8.4
1913	4,140	281	6.8	9.5

*From many localities only the fatal cases were reported, so that the figures in this column do not represent the number of cases that actually occurred.

INFLUENCE OF DENSITY OF POPULATION ON THE PREVALENCE OF SCARLET FEVER.

As indicated by the death rates, shown in Table 37, scarlet fever is most prevalent in the cities of large centers of population, the average death rate in those cities being more than twice as great as the average rate of each of the other two groups.

The 1913 death rate, compared with the average rate, shows an increase

of over 33 per cent in the group of cities of from 50,000 inhabitants and upwards, and an increase of 7 per cent in the rate for the group having from 10,000 to 25,000 population, while a decrease of 44 per cent is noted in the rate for the group of cities having from 25,000 to 50,000 population.

TABLE 37.—*The cases, deaths and death rates per 100,000 population from scarlet fever, in 1913, also the averages for the years, 1904-1912, in cities of Michigan of 10,000 inhabitants and over.*

Cities.	1913.			Average, 1904-1912.		
	Cases.	Deaths.	Deaths per 100,000 inhabitants.	Cases.	Deaths.	Deaths per 100,000 inhabitants.
CITIES OVER 50,000 INHABITANTS	1,974	137	19.2	.....	79	14.4
Detroit	1,415	111	20.6	869	69	17.6
Grand Rapids	378	22	18.2	356	9	8.5
Saginaw	181	4	7.6	60	1	2.0
CITIES FROM 25,000 TO 50,000 INHABITANTS	181	10	3.8	.....	13.9	6.8
Battle Creek	60	1	3.7	47	.3	1.2
Bay City	2	0	.....	206	7	17.1
Flint	48	4	7.9	44	1	4.0
Jackson	6	3	8.7	81	1	3.6
Kalamazoo	25	1	2.3	76	3	8.4
Lansing	11	0	.....	17	.6	2.1
Muskegon	29	1	3.9	70	1	4.5
CITIES FROM 10,000 TO 25,000 INHABITANTS	192	13	7.4	.....	11.3	6.9
Adrian	1	1	9.3	4	.4	3.8
Alpena	36	0	.....	1	.1	0.6
Ann Arbor	24	2	13.4	18	0	.....
Escanaba	3	1	7.0	17	.9	7.2
Ironwood	12	1	7.0	*	3	26.7
Ishpeming	4	0	.....	34	2	17.8
Manistee	65	4	32.7	32	1	8.5
Marquette	12	2	16.8	17	1	8.9
Menominee	0	0	.....	13	.6	5.9
Pontiac	9	1	6.1	21	.9	7.0
Port Huron	2	0	.....	31	.7	3.5
Sault Ste. Marie	10	1	7.6	9	.3	2.4
Traverse City	14	0	.....	24	.4	3.2

*Fatal cases only reported.

THE PREVALENCE OF SCARLET FEVER IN URBAN AND RURAL LOCALITIES.

In Table 38, and the diagram following, may be seen the death rates from scarlet fever in the urban and rural localities of Michigan.

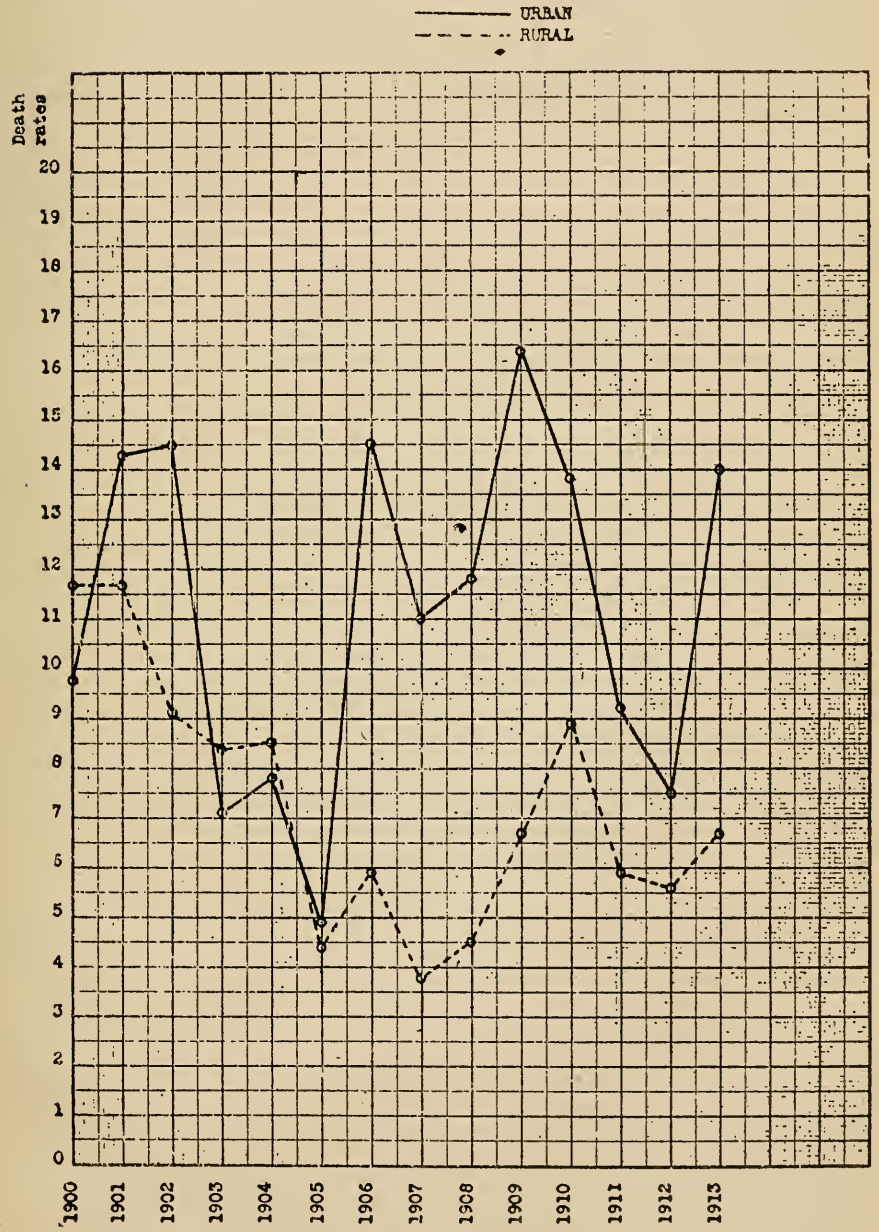
Since 1906, this disease, as indicated by the death rates, has been much more prevalent in the cities than in the rural localities. The minimum rate for the cities occurred in 1905, when it was 4.9, and the maximum rate was recorded in 1909, when it was 16.4. Since 1909, there has been a slight downward tendency in the rate. The minimum rate for the rural districts occurred in 1907, when it was 3.8, and the maximum rate was recorded in 1900, when it was 11.7, but since 1907, when the minimum rate was recorded, there seems to be a slight upward tendency in the prevalence of this disease in the rural districts.

TABLE 38.—*The death rates per 100,000 population from scarlet fever in the urban and rural localities, of Michigan, during each of the years, 1900-1913.*

Years.	Death rates per 100,000 population in—	
	Urban.	Rural.
1900	9.8	11.7
1901	14.3	11.7
1902	14.5	9.1
1903	7.1	8.4
1904	7.8	8.5
1905	4.9	4.4
1906	14.5	5.9
1907	11.0	3.8
1908	11.8	4.5
1909	16.4	6.7
1910	13.8	8.9
1911	9.2	5.9
1912	7.5	5.6
1913	14.0	6.7

NOTE.—The term "Urban" as here used is restricted to municipalities having 10,000 or more inhabitants in 1910; smaller places being included with the "Rural districts."

DIAGRAM SHOWING THE DEATH RATES FROM SCARLET FEVER PER 100,000 POPULATION OF THE URBAN AND RURAL LOCALITIES OF MICHIGAN, DURING THE YEARS, 1900-1913.



THE SEASONAL PREVALENCE OF SCARLET FEVER.

As indicated by the figures in the column captioned "Monthly deaths reduced to a standard of 100," in Table 39, scarlet fever is most prevalent during the months of from November to May, inclusive, and least prevalent during the months of August and September. In other words, scarlet fever is a cold weather disease.

TABLE 39.—*The seasonal fatality from scarlet fever, in Michigan, as indicated by the average number of deaths from this disease in each month in the sixteen years, 1898-1913.*

Month.	Average number of deaths occurring in each month during the years, 1898-1913.	Monthly deaths reduced to a standard of 100.
January	26	144.4
February	23	138.9
March	27	150.0
April	22	127.8
May	21	116.7
June	14	77.8
July	10	55.6
August	10	55.6
September	9	50.0
October	14	77.8
November	19	105.6
December	22	122.2
Annual average	217	100.0

AGE DISTRIBUTION OF SCARLET FEVER.

By reference to Table 40, it may be seen that, while scarlet fever is essentially a disease of childhood, there are deaths recorded from this disease at each age group throughout the entire lifetime.

Of the children, those whose ages range from one to five years, seem to be the most susceptible to this disease, while the susceptibility of those under one year of age and those of from 5-9 years, are practically identical. After the tenth year of age the death rate decreases very rapidly.

TABLE 40.—*The influence of age in fatal cases of scarlet fever, in Michigan, as indicated by the average number of annual deaths occurring from this disease at each age group and the death rates per 100,000 population of the same age, during the years, 1898-1913, inclusive*

Age groups.	Average annual number of deaths during the years, 1898-1913.	Death rates per 100,000 population of same age.
ALL AGES	216	8.3
Under 1 year	15	25.5
Under 5 years	120	42.9
5-9 years	61	22.5
10-19 years	24	4.6
20-29 years	7	1.6
30-39 years	3	0.7
40-49 years	.8	0.3
50-59 years	.3	0.1
60-69 years	.1	0.09
70-79 years	0	.....
80 years and over	.1	0.7
Unknown	.2	.....

SEX DISTRIBUTION OF SCARLET FEVER.

What has been stated regarding the influence of sex on the prevalence of whooping-cough, is true also with scarlet fever, as may be seen by reference to Table 41.

TABLE 41.—*The influence of sex in fatal cases of scarlet fever, in Michigan, as indicated by the number of annual deaths and the death rates per 100,000 population of each sex, during the years, 1898-1913.*

Years.	Annual deaths.		Death rates per 100,000 population of same sex.	
	Males.	Females.	Males.	Females.
1898	42	49	3.4	4.2
1899	71	73	5.7	6.2
1900	138	134	11.0	11.4
1901	146	166	11.6	14.0
1902	133	144	10.4	12.0
1903	95	105	7.4	8.6
1904	105	105	8.1	8.5
1905	69	54	5.3	4.3
1906	102	125	7.7	9.9
1907	74	85	5.5	6.7
1908	90	104	6.7	8.1
1909	131	144	9.6	11.0
1910	156	141	10.7	10.4
1911	109	99	7.4	7.2
1912	84	102	5.6	7.3
1913	141	140	9.2	9.9
Annual averages	105	111	7.8	8.7

MEASLES IN MICHIGAN IN 1913 AND PRECEDING YEARS.

GENERAL PREVALENCE.

As indicated by the death rates per 100,000 of population, shown in Table 42, measles was more prevalent, in this State, in 1913 than during the two preceding years.

TABLE 42.—*The prevalence of measles, in Michigan, during the twenty-four years, 1890-1913.*

Years.	*Cases.	Deaths.	Deaths per 100 cases.	Deaths per 100,000 population.
1890	11,911	140	1.2	6.7
1891	12,173	149	1.2	7.0
1892	3,830	76	2.0	3.5
1893	7,334	119	1.6	5.4
1894	10,518	55	.5	2.5
1895	3,870	12	.3	.5
1896	15,409	156	1.0	6.8
1897	32,543	159	.5	6.8
Average, 1890-1897	12,199	108	.9	4.9
1898	11,614	131	1.1	5.6
1899	12,005	187	1.6	7.8
1900	20,403	342	1.7	14.1
1901	4,629	79	1.7	3.2
1902	11,978	238	2.0	9.6
Average, 1898-1902	12,126	195	1.6	8.1
1903	8,941	176	2.0	7.0
1904	10,386	194	1.9	7.7
1905	6,061	123	2.0	4.8
1906	7,403	251	3.4	9.7
1907	12,139	256	2.1	9.8
Average, 1903-1907	8,986	200	2.2	7.8
1908	4,775	121	2.5	4.6
1909	9,047	270	3.0	10.1
1910	13,934	251	1.8	8.9
1911	9,639	200	2.1	7.0
1912	2,834	118	4.2	4.1
Average, 1908-1912	8,046	192	2.4	6.9
1913	9,185	253	2.8	8.6

*From many localities only the fatal cases were reported, so that the figures in this column do not represent the number of cases that actually occurred.

INFLUENCE OF DENSITY OF POPULATION ON THE PREVALENCE OF MEASLES.

Measles, according to the death rates shown in Table 43, is, on the average, most prevalent in large centers of population, and which prevalency seems to decrease with the decrease in the density of population. For the single year of 1913 this statement does not hold true, for the reason that the group of cities of from 25,000 to 50,000 inhabitants had a lower rate than did those cities of less population.

The cities having unusually high death rates from this disease in 1913 were: Pontiac (30.6), Escanaba (28.1), Ishpeming (23.3) and Detroit (19.6).

TABLE 43.—*The deaths and death rates per 100,000 population from measles, in 1913, also the averages for the years, 1904-1912, in cities of Michigan, of 10,000 inhabitants and over.*

Cities.	1913.		Average, 1904-1912.	
	Deaths.	Deaths per 100,000 inhabitants.	Deaths.	Deaths per 100,000 inhabitants.
CITIES OVER 50,000 INHABITANTS	123	17.2	47	8.6
Detroit	106	19.6	40	10.2
Grand Rapids	11	9.1	5	4.7
Saginaw	6	11.4	2	4.0
CITIES FROM 25,000 TO 50,000 INHABITANTS	16	6.0	16	7.8
Battle Creek	0	.....	3	12.0
Bay City	8	16.9	7	17.1
Flint	0	.....	2	8.1
Jackson	6	17.4	.6	2.2
Kalamazoo	0	.....	2	5.6
Lansing	2	5.4	1	3.4
Muskegon	0	.....	.4	3.4
CITIES FROM 10,000 TO 25,000 INHABITANTS	17	9.7	9.9	6.0
Adrian	0	.....	.4	3.8
Alpena	0	.....	1	7.8
Ann Arbor	0	.....	.4	2.7
Escanaba	4	28.1	.6	4.8
Ironwood	2	14.1	.8	7.1
Ishpeming	3	23.3	2	17.8
Manistee	1	8.2	.4	3.4
Marquette	0	.....	.6	5.3
Menominee	0	.....	.6	5.9
Pontiac	5	30.6	.7	5.5
Port Huron	2	10.9	.9	4.5
Sault Ste. Marie	0	.....	.8	6.5
Traverse City	0	.....	.7	5.7

THE SEASONAL PREVALENCE OF MEASLES.

As indicated by the figures shown in the column captioned "Monthly deaths reduced to a standard of 100," in Table 44, measles is most prevalent during the months of March, April and May, and least prevalent during the months of September and October.

TABLE 44.—*The seasonal fatality from measles, in Michigan, as indicated by the average number of deaths from this disease in each month in the sixteen years, 1898-1913.*

Month.	Average number of deaths occurring in each month during the years 1898-1913.	Monthly deaths reduced to a standard of 100.
January	17	100.0
February	17	105.9
March	28	164.7
April	31	188.2
May	34	200.0
June	23	141.2
July	15	88.2
August	7	41.2
September	3	17.6
October	5	29.4
November	8	47.1
December	12	70.6
Annual average	200	100.0

AGE DISTRIBUTION OF MEASLES.

As indicated by the death rates per 100,000 of population at each age group, as shown in Table 45, measles is most prevalent among children under five years of age. Of the children under five years of age, those under one year of age seem to be the most susceptible to the disease, their death rate being 84.4, while the rate for those under five years of age is 52.6. After the fifth year of age the death rate decreases very rapidly. It will be noted, however, that all persons, regardless of age, are liable to this disease.

TABLE 45.—*The influence of age in fatal cases of measles, in Michigan, as indicated by the average number of annual deaths from this disease occurring at each age group and the death rates per 100,000 population of the same age, during the years, 1898-1913, inclusive.*

Age groups.	Average annual number of deaths during the years, 1898-1913.	Death rates per 100,000 population of same age.
ALL AGES	199	7.6
Under 1 year	51	84.4
Under 5 years	147	52.6
5-9 years	20	7.5
10-19 years	14	2.7
20-29 years	7	1.6
30-39 years	5	1.4
40-49 years	3	1.1
50-59 years	1	0.6
60-69 years	.4	0.3
70-79 years	.6	0.9
80 years and over	.2	1.1
Unknown	.2	.....

SMALLPOX IN MICHIGAN IN 1913 AND PRECEDING YEARS.

GENERAL PREVALENCE.

As may be seen by reference to Table 46, there were reported to this Board, in 1913, 1,995 cases of smallpox, of which number 4, or two-tenths of one per cent, proved fatal, this being the lowest fatality rate recorded from this disease in any year since 1906. The number of cases of smallpox reported in 1913 would indicate that this disease was unusually prevalent during that year, compared with the two preceding years; but if the death rates are taken as an indication of the prevalence of the disease, then it will be noted that the prevalency in 1913 was identical with that of the preceding year and over 33 per cent less prevalent than in 1911.

TABLE 46.—*The prevalence of smallpox, in Michigan, during the thirty-two years, 1882-1913.*

Years.	Cases.	Deaths.	Deaths per 100 cases.	Deaths per 100,000 population.
1882	589	159	27.0	9.1
1883	29	2	6.9	.1
1884	22	3	13.6	.2
1885	27	6	22.2	.3
1886	24	7	29.2	.4
1887	4	0	.....	.....
1888	42	6	14.3	.3
1889	57	4	7.0	.2
1890	2	0	.....	.....
1891	3	0	.....	.....
1892	1	1	100.0	.05
1893	10	3	30.0	.1
1894	285	60	21.1	2.7
1895	187	47	25.1	2.1
1896	38	16	42.1	.7
1897	15	0	.....	.....
Average, 1882-1897	83	19	23.5	1.0
1898	32	1	3.1	.04
1899	139	6	4.3	.3
1900	694	9	1.3	.4
1901	5,088	31	.6	1.3
1902	7,086	40	.6	1.6
Average, 1898-1902	2,608	17	.7	.7
1903	6,341	33	.5	1.3
1904	5,753	24	.4	.9
1905	2,985	74	2.5	2.9
1906	1,240	3	.2	.1
1907	1,712	8	.5	.3
Average, 1903-1907	3,606	28	.8	1.1
1908	2,306	8	.3	.3
1909	1,533	4	.3	.2
1910	3,319	120	3.6	4.3
1911	898	9	1.0	.3
1912	1,127	3	.3	.1
Average, 1908-1912	1,837	29	1.6	1.0
1913	1,995	4	.2	.1

ACUTE ANTERIOR POLIOMYELITIS (INFANTILE PARALYSIS), IN MICHIGAN, IN 1913 AND PRECEDING YEARS.

The following table shows the general prevalence of this disease during the four years, 1910-1913:

Year.	Cases.	Deaths.	Deaths per 100,000 population.
1910	104	72	2.6
1911	68	35	1.2
1912	78	33	1.1
1913	56	29	1.0

As indicated by the death rates shown in the above table, it would seem that this disease is becoming less prevalent in this State.

CHICKEN-POX (VARICELLA) IN MICHIGAN IN 1913.

During the year 1913 chicken-pox was reported present in 19 localities of the State, 190 households being infected, with a total of 265 cases, none of which proved fatal.

ERYSIPELAS IN MICHIGAN IN 1913.

During the year 1913 reports were received relative to 184 cases of erysipelas in this State, 96 of which proved fatal.

MUMPS (PAROTITIS) IN MICHIGAN IN 1913.

During the year 1913, only three non-fatal cases of mumps were reported to this Board.

PELLAGRA IN MICHIGAN IN 1913.

One death from this disease was reported to this Board during the year 1913. The deceased was a female, aged 11 years, and resided in Clam Lake township, Wexford county.

SYPHILIS IN MICHIGAN IN 1913.

There were reported to this Board during the year 1913, six cases of syphilis from four localities of the State.

GONORRHOEA IN MICHIGAN IN 1913.

Gonorrhoea was reported present in eight localities of the State with a total of 22 cases.

TETANUS (LOCK-JAW) IN MICHIGAN IN 1913.

During the year 1913, there were reported to this Board 22 cases of tetanus, all of which proved fatal.

Of the eighteen cases in which a source of infection was stated, four were due to fracture of limbs, three to gunshot wounds, three to wounds from rusty nails, two as the result of operations, and six to miscellaneous injuries.

DISEASES OF ANIMALS DANGEROUS TO MAN, IN MICHIGAN, IN 1913.

Whenever information is received at this office of the occurrence of an outbreak of any disease of animals, which, by reason of its communicability, may be considered dangerous to man, efforts are made to learn all facts relative to such outbreaks. The matter is reported to the State Live Stock Sanitary Commission, and the attention of the health officials of the locality, where the disease is reported present, is called to the fact of its reported prevalence, and they are requested to take immediate measures for the prevention of its spread, by establishing and maintaining quarantine over the diseased animals until relieved by the State Live Stock Sanitary Commission.

During the year 1913 the two following diseases of this character were reported to this Department:

RABIES (HYDROPHOBIA) IN MICHIGAN IN 1913.

During the year 1913 two outbreaks of rabies among dogs were reported to this Department. Four persons were bitten, but by prompt treatment at the Pasteur Institute, at Ann Arbor, no deaths resulted.

ACTINOMYCOSIS (LUMPY-JAW) IN MICHIGAN IN 1913.

During the year 1913, one death from this disease was reported to this Department. Deceased was a male, aged 12 years, and the duration of the disease was three months.

INDEX.

ERRATA.

On Page 133 read "MENINGITIS" as all forms are included under the heading "Epidemic Cerebro Spinal."